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United Effort of Those Engaged in Pharmacy and the Drug Trade Activities Is Helpful, if Not Essential, for the Success of the Endeavors of Pharmacy; They Are Appraised by Others According to the Quality of Support Given to Its Projects by Pharmacists.

Vol. XXI, No. 4 APRIL, 1932

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

TRADE MARK

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Published Monthly by the American Pharmaceutical Association: Office of publication, 20th & Northampton Sts., Easton, Pa. Editorial Office, 10 West Chase St., Baltimore, Md. Annual Subscription, $4.00; Single Numbers, 35 Cents.

THE 80th ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN TORONTO, CANADA, IN 1932—August 22nd–27th, Royal York Hotel, Headquarters, R. B. J. Stanbury, 43 Victoria St., Toronto 2, Canada, Local Secretary.

The 1932 Meetings of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, Conference of Pharmaceutical Association Secretaries, of the Pharmaceutical Law Enforcement Officials and the Plant Science Seminar will also be held in Toronto.

Entered as second-class Matter, January 23, 1917, at the Post Office at Easton, Pa., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103. Act of October 3, 1917; authorized July 10, 1918.

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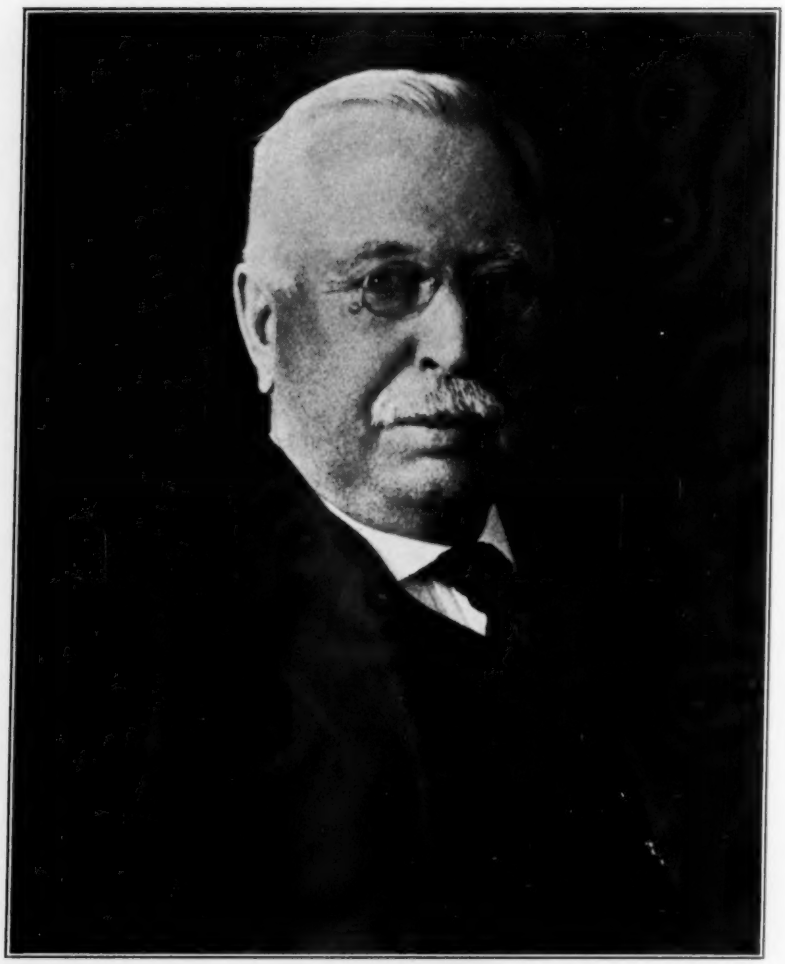
NOTICE TO RESEARCH WORKERS IN PHARMACY.

The 1932 Annual Census of Research Work in Pharmacy of the National Conference on Pharmaceutical Research is now under way. Blanks have been sent to all research workers who have previously registered.

Please Note.—It is requested that those who have not received such a blank, and are doing research work in pharmacy, or in subjects pertaining to pharmacy—write to Dr. James C. Munch, 19 South Rigby Ave., Lansdowne, Penna., at once reporting your name, address, position or title in laboratory and the names of the specific researches which you have under way.

The purpose is to incorporate the foregoing information in a series of tables, listing the specific products upon which investigations are now under way. Therefore, particular or specific information is desired, rather than a general statement "U. S. P. research."

It is desired that this information be received at the earliest possible moment and not later than May 1st.



CALDWELL SWEET,

Bangor, Me.

Joined AMERICAN PHARMACEUTICAL ASSOCIATION 1881. (Died July 26, 1928.)

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XXI APRIL, 1932 No. 4

PRELIMINARY REPORT FROM THE AMERICAN PHARMACEUTICAL ASSOCIATION TRANSPORTATION COMMITTEE.

The A. PH. A. Transportation Committee (for names of the members of the Committee see page 304, March JOURNAL, A. PH. A.) is pleased to announce that reduced rates on the Identification-Certificate Plan will be allowed to the 1932 joint convention of the AMERICAN PHARMACEUTICAL ASSOCIATION and related organizations, and the Canadian Pharmaceutical Association, at Toronto, in August.

The secretaries of the A. PH. A. and the C. Ph. A., in due time, will send certificates to the members with further information about the meeting. These certificates will entitle members to buy excursion tickets at one and one-half fares for the round trip for themselves and members of their families, excepting from stations near Toronto, with low fares.

The tickets will be sold from August 12th to August 23rd on presentation of the identification certificates and will be good for return to the starting point for thirty days from the date of sale. Also, different routes for the going and returning journeys will be allowed. This will be the first time that this privilege of diverse routes on reduced fares has been allowed to meetings of our ASSOCIATION. The dates for the sale of tickets are arranged to cover the meetings of related organizations during the week preceding the convention.

Toronto is one of the most attractive and conveniently located cities in North America and the meeting is to be held at the best season of the year for a visit to this region. Also, the famous Canadian National Exposition begins on Friday of the week the meeting is held. Added to these attractions, the transportation arrangements are the most favorable we have ever been able to secure. These conditions should result in the record-breaking attendance which is confidently expected.

THEODORE J. BRADLEY,
Chairman.

BOSTON, MASSACHUSETTS,
March 30, 1932.

HOTEL ACCOMMODATION.

Joint Convention—American Pharmaceutical Association—Canadian Pharmaceutical Association and Ontario Retail Druggists Association—August 22 to 27, 1932.

	Single.		Double.	
	With bath.	Without bath.	With bath.	Without bath.
Royal York Hotel Convention Headquarters	$4.00 to $7.00		$7.00 and up	
King Edward Hotel King St. at Victoria	$3.00 to $4.50	$2.50	$4.50 and up	$3.50
Prince George Hotel King & York Sts.	$3.00 to $3.50	$2.00 & $2.50	$4.50 and up	$3.50 and up
Carls-Rite Hotel Front & Simcoe Sts.	$2.50 and up	$1.50 and up	$4.00 and up	$3.00 and up
Walker House Front & York Sts.	$3.50 and $4.00	$2.50	$6.00 and $7.00	$4.00 & $5
Hotel Waverly Spadina & College	$3.00 & $3.50	$2.00	$4.50 to $6.00	$3.00 & $3.50
Ford Hotel Bay & Dundas Sts.	$2.00 & $2.50	$1.50	$3.50 & up	$3.00
Alexandra Palace 184 University Ave.	$2.50 & $3.00		$4.00 & $5.00	
Westminster Hotel 240 Jarvis St.	$2.50 & $3.00		$4.50 & $5.50	
Westmoreland Hotel 254 Jarvis St.	$2.00 & $3.00	$1.50	$3.00 to $5.50	$2.50
Royal Cecil Hotel Jarvis & Dundas Sts.	$2.00		$3.00	
Tudor Hotel 559 Sherbourne St.	$3.00 to $4.00		$4.00 to $6.00	
Isabella Hotel 556 Sherbourne St.	$2.00 & $2.50		$3.00 to $4.00	
Marlborough Hotel 214 Jarvis St.	$2.00	$1.50	$3.00	$2.00
Tusco Hotel 235 Jarvis St.	$1.50 to $2.50		$2.50 to $4.00	
Stoodleigh Hotel 76 Shuter St.		$1.00 to $1.50		$2.00

NOTE: Make Hotel Reservations Direct. In case of difficulty in securing accommodation write to N. B. Strong, Chairman Hotels Committee, King Edward Hotel or F. R. Rutherford, Vice-Chairman, Hotels Committee, Royal York Hotel.

GARAGE ACCOMMODATION.

Convenient to Convention Headquarters (The Royal York) and other hotels.

Petrie's Parking Place, 131 Front Street West; York Garage, 126 Adelaide Street West; Bay-Front Garage, Ltd., 159 Bay Street; St. James Garage, Corner Church & Lombard Sts.; Bay Adelaide Garage, 65 Adelaide Street West; Commonwealth Garage, Corner Victoria & Colborne.

Provided, delegates make arrangements personally with garages on arrival, the following rates have been arranged: 60¢ per day from 8 A.M. to 12 P.M.; $1.00 over night or 24 hours; $3.00 for 4 days' parking.

EDITORIAL

E. G. EBERLE, EDITOR 10 West Chase Street, BALTIMORE, MD.

PHARMACY LAWS AND COURT DECISIONS.

DR. THEODORE B. APPEL of the Pennsylvania Board of Health, in an address, stressed the importance of pharmacy as a public health activity and that in order to render the service expected of him "the pharmacist must be a real student and be familiar with his wares;" he must take his stand in the line of battle for general public health and do his part in molding public opinion along proper lines.

Judge Cooley expressed the responsibilities of the pharmacist in the following lines: "People trust not merely their health, but their lives, to the knowledge, care and prudence of druggists, and in many cases a slight want of care is liable to prove fatal to some one. It is, therefore, proper and reasonable that the care required shall be proportional to the danger involved."

In all court decisions in which restrictive measures that apply to medicines are involved there is a question of safeguarding the life and health of the citizens; hence, aside from provisions which give such protection through qualified pharmacists, it is of equal importance that pharmacists be observant of their professional obligations and desire to serve. The progress of the industries depends not only on the regulation of its practices, and reasonable observation of the ethics, but on bringing into active coöperation all of its divisions.

A part of the decision of the United States Supreme Court in the Pennsylvania Ownership Law is quoted, because it pointed out the desirability of restricting the dispensing of medicine to qualified pharmacists. It will be remembered that the law was declared unconstitutional, Judges Holmes and Brandeis dissenting.

"A state undoubtedly may regulate the prescription, compounding of prescriptions, purchase and sale of medicines, by appropriate legislation to the extent reasonably necessary to protect the public health. And this the Pennsylvania legislature sought to do by various statutory provisions in force long before the enactment of the statute under review.

"Briefly stated, these provisions are: No one but a licensed physician may practice medicine or prescribe remedies for sickness (Pa. St. 1290, Section 16,779); no one but a registered pharmacist lawfully may have charge of a drug store (Pa. St. 1920, Sections 9323, 9327); every drug store must itself be registered, and this can be only done where the management is in charge of a registered pharmacist (Pa. St. Supp. 1928, Section 9329a–2); stringent provision is made to prevent the possession or sales of any impure drug or any below the standard, strength, quality and purity as determined by the recognized pharmacopœia of the United States (Pa. St. 1920, Section 9337; Pa. St. Supp. 1928, Section 9339); none but a registered pharmacist is permitted to compound physicians' prescriptions (Pa. St. 1920, Sections 9317, 9323); and, finally, the supervision of the foregoing matters and the enforcement of the laws in respect thereof are in the hands of the State Board of Pharmacy, which is given broad powers for these purposes.

"It, therefore, will be seen that without violating laws, the validity of which is conceded, the owner of a drug store, whether a registered pharmacist or not,

cannot purchase or dispense impure or inferior medicines; he cannot, unless he be a licensed physician, prescribe for the sick; he cannot, unless he be a registered pharmacist, have charge of a drug store or compound a prescription. Thus, it would seem, every point at which the public health is likely to be injuriously affected by the act of the owner in buying, compounding or selling drugs and medicines is amply safeguarded."

Among the points in pharmacy legislation that present difficulties are definitions for items used as medicines and for other purposes, but court decisions are reducing the number of these disturbing factors.

Several decisions, by reference and otherwise, will serve as comment. In the Nebraska case the Supreme Court considered the points raised in the appeal from the District Court, showing that the law was too inclusive. The decision is set forth in the syllabus of the case, as follows:

"1. The police power is an attribute of state sovereignty, and, within the limitations of State and Federal constitutions, the state may, in its exercise, enact laws for the promotion of public safety, health, morals, and generally for the public welfare.

"2. The legislature may not, under the guise of police regulations, arbitrarily invade personal rights or private property.

"3. A law which restricts to registered pharmacists the sale of such articles as salt, soda, soap, distilled water, corn starch and other useful but harmless articles, does not tend to promote the public health or welfare, but tends to place in the hands of a limited class a monopoly of the sale of such articles. Such an act is beyond the scope of the police power and is invalid."

A general statement, restricting items of commercial sale to the pharmacy which have, for example, much larger use in baking, horticulture, etc., would probably not stand the test of courts. Designating items that may or may not be sold except by pharmacists makes the law more definite, but conditions may develop which render that provision of the law unenforcible; medicinal use enters into the question; articles for which there has been only such use may find other extended application.

A recent California decision found, in a case wherein the plaintiff contended for the right to sell anywhere, within or without the 3-mile provision—Cardamom seed, zinc oxide tape, hydrogen peroxide, saltpetre and cod liver oil—that these were medicines, even though they may have other uses and, hence, came within the regulations of the Pharmacy Act. The same Court also defined a "Proprietary Medicine" as a preparation which does not describe its constituents or ingredients, and the names of which do not give any intimation of what the preparations are, or what they are intended to cure. The preparations which were under consideration indicated their composition and, hence, the Court held these preparations subject to regulation under the California Pharmacy Act.

It remains for states to make more general applications of decisions and the laws effective; definitions of laws become fixed by making use of the rulings; the uncertainties of laws are defined by decisions, even though the periods during which they are enforced may be limited. In pharmacy laws public health is of first importance and the duty of pharmacists is to continue in these efforts to shape public opinion and impress the importance of the service of pharmacy.

MODIFICATION OF LAW ON PRESCRIPTIONS FOR LIQUORS.

CHANGES in the Volstead Act to remove the limitation permitting physicians to prescribe only a pint of liquor per patient every ten days, but retaining stringent regulatory powers to curb any misuse of the proposed change, were endorsed, April 8th, by James M. Doran, Commissioner of Industrial Alcohol and Amos W. W. Woodcock, Director of Prohibition, when they testified before a subcommittee of the House Committee on Judiciary.

The present limitation of the amount of liquor a physician may prescribe to one patient, Dr. Doran testified, "was one of the most irritating things in the law that might well be made subject to regulation rather than to statutory control."

The removal of this limitation was favored also by Dr. William C. Woodward, of Chicago, legislative counsel of the American Medical Association. Pharmacists dispense "liquor prescriptions" in the discharge of duties—which have been delegated to them and they have assumed—as other medicines, narcotics for example, that can only be dispensed on physicians' orders; the more prescriptions they have to fill the greater their liability in respect to good faith. Representative Boland favored repeal of the limitation on the number of prescriptions in a given period; that is, authority for physicians to write prescriptions for liquor as freely as any other prescriptions, using their own judgment as to the needs of the patient.

PHARMACY IN MOTION PICTURES.

THE FINE relations which exist between the pharmacists of Canada and of the United States was recently shown in a coöperation which brought results that merit editorial notice. A picture shown in Canada and in the United States impersonated a drunkard leaving a train and making his way to a drug store to buy "Jamaica Ginger." Editor Stanbury received a letter of protest from a subscriber of the *Canadian Pharmaceutical Journal* and several communications of similar tone were received at the office of the AMERICAN PHARMACEUTICAL ASSOCIATION. Dr. Stanbury mailed a copy of the letter received by him to Secretary Kelly, of the A. PH. A., and the latter at once addressed a protest to President Will H. Hays, of the Motion Picture Producers and Distributors of America, Inc. While action, without resolution, would have been taken in the matter, the letter was drafted, responsive to *Resolution No. 16*, adopted at Miami, which reads:

> *Resolved*, that the AMERICAN PHARMACEUTICAL ASSOCIATION condemn in the strongest manner possible any reference to Pharmacy on the part of the press, radio, moving picture or theater which would reflect in any manner upon the integrity and good name of Pharmacy, and that the executive officers of this ASSOCIATION be instructed to voice our protest whenever and wherever such reflection becomes evident.

Mr. Hays closed his answer to Secretary Kelly in saying

> "I am glad to send a copy of your letter to the director of the Studio Relations Committee in Hollywood so that he may bring the subject matter directly to the attention of the men who make the pictures. This is, I am certain, the most effective way to register the suggestion with which we are all in most hearty accord.
>
> "May I express, too, my appreciation for the sympathetic understanding with which you approach the matter."
>
> (*Signed*) WILL H. HAYS.

The editorial of the *Canadian Pharmaceutical Journal* refers to coöperation at home, and the succeeding paragraph reads:

"Now we have come to another stage and mark another era in the progress of organized and coöperative effort. The report which appears in this issue (March 1) of the *Journal* of the effective protest against the defamation of druggists in motion pictures, is an evidence that in these days when we have so many interests in common with our neighbors to the south, it is mutually beneficial to coöperate internationally."

The last two paragraphs of the editorial read:

"The arranging of the joint convention of the two associations, we believe, has started something which will be to our mutual benefit.

"We now feel closer-knit to our brethren south of the line, and believe in future we will cooperate in all those movements which tend to the protection and the elevation of pharmacy in both countries."

The attitude of Mr. Hays reflects his regret, and the fact that the actor was given the annual award of the Academy of Motion Picture Arts and Sciences for the finest piece of acting in the past year, accounts in part for its presentation without due regard for the feelings of those who were offended. Assuredly, there was no desire to offend them.

INTERNATIONAL CONGRESS OF MILITARY MEDICINE AND PHARMACY.

ON MARCH 30th The Speaker laid before the House the following message (S. Doc. No. 74), from the President of the United States, which was read and with the accompanying papers, referred to the Committee on Foreign Affairs and ordered printed:

To the Congress of the United States:

I commend to the favorable consideration of the Congress the inclosed report from the Secretary of State to the end that legislation may be enacted to authorize an appropriation of $10,000 for the expenses of participation by the United States in the Seventh International Congress of Military Medicine and Pharmacy, which will be held in Madrid in 1933.

Congressional Record.

The King of the Belgians called the first International Congress of Medicine and Pharmacy which met in Brussels in July 1921; twelve countries were represented. The Congress meets every second year and the sessions have been held in Rome, Paris, Warsaw, London and The Hague; the next session will be held in Madrid. Pharmacists have been delegated from other countries, but none from the United States. While the greater number of delegates should be medical officers, pharmacy should be represented. The United States Pharmacopœia is conceded a foremost rank, and American pharmacists should be given representation in the Congress.

THE SERVICE OF PHARMACISTS.

PIERRE ROBIQUET (1780–1840) served his pharmacy apprenticeship at Lorient and afterward studied under Fourcroy and Vauquelin in Paris. For some time he was with Napoleon's army in Italy; returning to Paris he became

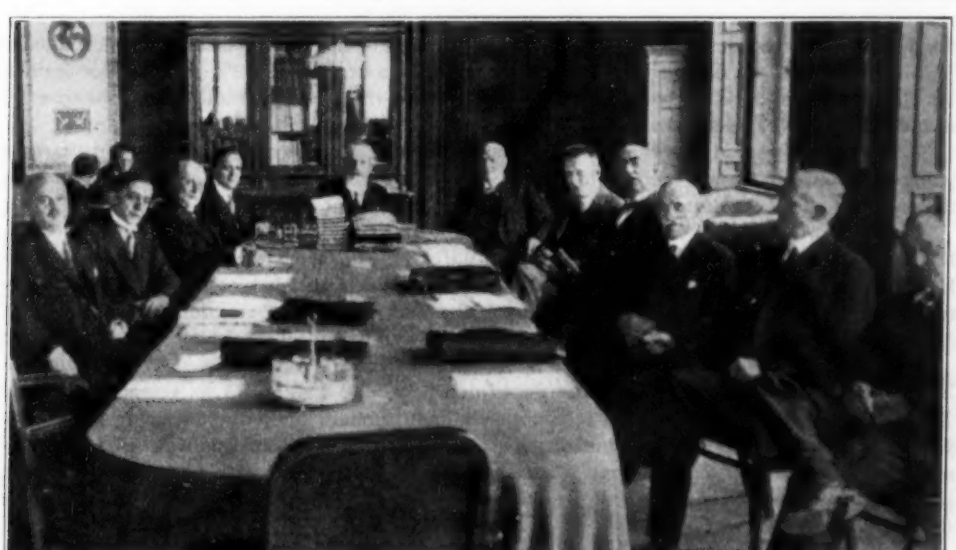
the proprietor of a pharmacy and manufacturer of fine chemicals. He separated asparagin and did considerable work on opium and its salts, cantharides, barytes and nickel.

ANTOINE AUGUSTIN PARMENTIER, pharmacist, (1737–1813) served an apprenticeship in a pharmacy at Montpellier and distinguished himself in the pharmaceutical service of the French army especially in the course of an epidemic by which the French soldiers suffered greatly. After being released in Germany as a prisoner he obtained employment in Frankfort. Opportunity was offered him to remain but he preferred to return to France where he was appointed pharmacist in the Hotel des Invalides, rising to Chief Apothecary. In 1771, he won a prize offered by the Academy of Besancon for the best means to avert the calamities of famine. He utilized his experience in Germany in the cultivation of potatoes, which had gone out of favor because they were thought to bring about diseases—leprosy and various fevers. To combat this prejudice Parmentier sought every possible means and finally triumphed. He contributed largely to the organization of the pharmaceutical service in the French army.

PRESCRIPTION AND DRUG STORE SURVEY.

We hope to have in this number of the JOURNAL an abstract of an address by Frank A. Delgado, at Purdue University, on "The National Drug Store Survey." The reports will show, in a degree, the time he has given to this important work and how successful he has been in this undertaking.[1] Attention is called to the "Prescription Ingredient Survey" and "The Use of Fluidextracts during the Past Fifty Years,[2]" by Chairman E. N. Gathercoal. A careful study of these investigations will supply valuable information for revision work and for every pharmacist.

[1] If in time for this month's printing the address will be found following the Department of Association of Colleges. [2] March JOURNAL, pages 274–284.



Meeting of the Executive Committee of the International Pharmaceutical Federation at Budapest. Dr. Van Itallie was unavoidably absent and M. Barthet presided in his stead; on his left is the late Prof., Dr. H. Thoms.

SCIENTIFIC SECTION

VIII. THE STANDARDIZATION AND STABILIZATION OF ERGOT PREPARATIONS.

BY EDWARD E. SWANSON, CLARENCE E. POWELL, ASA N. STEVENS AND E. H. STUART.

(*Continued from page 239, March 1932*)

EXPERIMENTAL DATA ON THE ALKALOIDS OF ERGOT.

Considering the above data and the reported work of others, the question of deterioration and stability of the ergot alkaloids is indeed a complicated problem. Stoll and Rothlin (18), Wokes (13), and Thompson (7) have already reported evidence showing that exposure to air or oxidation and increased temperature destroys the alkaloids of ergot. Swanson (8) observed that the hydrogen-ion concentration may have some influence on the stability of the alkaloids. In this report we show that the hydrogen-ion concentration still appears to have some control in the stability of the alkaloids of ergot.

There are many factors that may have some part in affecting the decomposition of the alkaloids of ergot. The acidity of the ergot drug, the process of defatting, the effect of temperature changes, the effect of oxidation or exposure to air, and the action of the amines and buffer salts which are naturally found in the drug, all appear to have some influence on the stability of the alkaloids.

Experimental evidence show that the ergot alkloids are the constituents which are specific for the drug and responsible for the desired clinical effects of its preparations. The amines in ergot are considered to be non-specific. Spiro and Stoll (16), Forst and Weese (17), and Thompson (7) observed that these non-specific amines are variable in the crude drug. The amines that have been identified in the drug are histamine, acetyl-choline and other cholines, tyramine, agmatine, isoamylamine and guanido-butylamine. There appears to be no available data as to the amount of these amines in the drug. Thompson (7) by his histamine guinea pig method and by the depressor method determined the amine content of ergot in terms of histamine. Thompson (7) found that various commercial crude ergot samples contained 0.012% to 0.15% of amines calculated in terms of histamine. He also suggests that in preparing the Fluidextract of Ergot the amines be removed by percolation with 5% sodium bicarbonate solution.

We are now studying the effects of various acids, hydrogen-ion concentration, various buffer salts and the various amines (histamine, tyramine and choline) on an alcoholic solution of the pure crystals of ergotamine tartrate (Sandoz) and ergotoxine salts.

As shown in Table VII ergotamine tartrate 0.05% was dissolved in 40% alcohol, 0.5% KH_2PO_4 was added and divided into five equal parts. To each part was added sufficient $M/5$ HCl to give the various hydrogen-ion concentrations. Each sample was aerated for 48 hours to 72 hours by passing a current of air through the solutions. After aeration each sample was assayed for total alkaloid by the Epinephrine-Reversal and Chemical (Smith's) Methods.

To samples Nos. 6, 7 and 8, 0.05% ergotamine tartrate was dissolved in 40% alcohol. $NaH_2PO_2H_2O$ 0.5% was added and the p_H adjusted to 2.20, 3.15 and 4.30, respectively, with $M/5$ HCl. Samples Nos. 9, 10 and 11 contain the same amount of ergotamine tartrate and the p_H adjusted with $M/5$ HCl. No buffer salts were added. These solutions were all aerated by a current of air. After aeration, and adjusted to the original volume with an alcoholic solution, the samples were assayed by the Epinephrine-Reversal (Broom and Clark) and the Chemical (Smith's) Methods.

As shown in Table VII the ergotamine solutions with hydrogen-ion concentrations of 4.20, 4.30 and 4.10 show a distinct loss in potency after 72 hours' aeration, particularly solutions Nos. 5 and 8. Apparently 0.5% of the buffers KH_2PO_4 and $NaH_2PO_2.H_2O$ did not aid in the prevention

of deterioration inasmuch as solution No. 11 adjusted with *M*/5 HCl to 4.10 alone shows only a 10% loss after aeration. Solutions Nos. 3, 4, 7 and 10 with hydrogen-ion concentrations of 2.90, 3.00, 3.15 and 2.92, respectively, show no loss of potency after 72 hours' aeration. Solutions Nos. 1, 6 and 9 with hydrogen-ion concentrations of 2.20, 2.20 and 2.10 show only a slight loss in potency after aeration; solution No. 1 with KH_2PO_4 and HCl showing a 10% loss by the Epinephrine-Reversal Method and no loss by the Chemical Method. Solution No. 6 with $NaH_2PO_2H_2O$ and HCl shows no loss by either method, and solution No. 9 a loss of 5% by the Biological Method and 10% loss by the Chemical Method after 72 hours' aeration.

TABLE VII.—AERATED SAMPLES OF ERGOTAMINE TARTRATE IN 40% ALCOHOL WITH VARIOUS BUFFERS AND p_H ADJUSTED WITH HCl.

				Epinephrine-Reversal Method.			Chemical Method (Smith's).		
No. of Sample.	Buffer 0.5%.	p_H Adjusted with HCl *M*/5.	Hours Aerated.	Before aeration.	After aeration.	Total loss by aeration.	Before aeration.	After aeration.	Total loss by aeration.
1	KH_2PO_4	2.20	72	100%	90%	10%	100%	100%	No loss
2	KH_2PO_4	2.90	48	100%	100%	No loss	...	...	....
3	KH_2PO_4	2.90	72	100%	100%	No loss	90%	90%	No loss
4	KH_2PO_4	3.00	72	90%	90%	No loss	80%	80%	No loss
5	KH_2PO_4	4.20	72	100%	50%	50%	100%	25%	75%
6	$NaH_2PO_2.H_2O$	2.20	72	100%	100%	No loss	100%	100%	No loss
7	$NaH_2PO_2.H_2O$	3.15	72	100%	100%	No loss	100%	100%	No loss
8	$NaH_2PO_2.H_2O$	4.30	72	100%	85%	15%	100%	75%	25%
9	None	2.10	72	100%	95%	5%	100%	90%	10%
10	None	2.92	72	100%	100%	No loss	100%	95%	5%
11	None	4.10	72	100%	90%	10%	100%	90%	10%

As shown in Table VII, a solution of pure ergotamine tartrate crystals in 40% alcohol with a *hydrogen-ion concentration of around 3.00 appears to be the critical point where there is the least deterioration.*

These experiments of various acids, buffers and reducing agents with the pure alkaloids of ergotamine and ergotoxine and the Fluidextract of Ergot is being continued and will be reported in a later article.

DISCUSSION.

Many workers with experience in the assay of ergot and its preparations apparently agree that the Epinephrine-Reversal Method is more accurate than the U. S. P. Cock's Comb Method. By the Epinephrine-Reversal Method, the amines (histamine, tyramine and cholines) in percentage equivalent to or twice that of the alkaloidal content of ergot, do not have synergistic or antagonistic effects on the inhibiting property of the alkaloids. By the U. S. P. Cock's Comb Method, there is experimental evidence that these amines apparently have some influence on the action of the ergot alkaloids.

The Chemical Method (Smith's) deserves further consideration. The results as shown in Table III show correlative results with the Epinephrine-Reversal Method. However, these results were obtained by comparison with the same ergotamine tartrate. We do not know whether all samples of ergotamine tartrate or ergotoxine phosphate or ergotoxine ethane-sulphonate in equivalent amounts of the base will give the same color reaction. Is ergotamine tartrate or ergotoxine phosphate a reliable standard for the Chemical Method (Smith's)? There is evidence that ergotamine tartrate contains more than one type of crystals.

The hydrogen-ion concentration still appears to have some influence on the stability of some Fluidextracts of Ergot and of the pure crystals of ergotamine tartrate. A p_H of around 3.00 appears to be the critical point where there is the least

deterioration. For some Fluidextracts of Ergot deterioration takes place regardless of the hydrogen-ion concentration.

The data in this report show *no definite conclusions that the deterioration of Fluidextracts of Ergot or a solution of the pure ergotamine tartrate is prevented by a definite hydrogen-ion concentration.*

The object of our present and future researches on this problem is to determine first the stability factors of a solution of the pure crystals of the alkaloid, and second, to apply these findings to the Fluidextract of Ergot.

CONCLUSIONS.

1. The Epinephrine-Reversal Method (Broom and Clark) is a reliable method for the biological assay of ergot.
2. The Chemical Method (Smith's) shows promising results and deserves further consideration.
3. The hydrogen-ion concentration appears to have some influence on the stability of the ergot alkaloids.
4. From the above data no definite conclusions can be formulated that a certain hydrogen-ion concentration prevents the deterioration of the fluidextract or a solution of the pure ergot alkaloid.

The authors wish to express their appreciation to C. C. Hargreaves and F. A. Whipple for their kind assistance.

ADDENDUM BY E. E. SWANSON.

(Inserted September 15, 1931.)

While this paper was being written and completed, more data on the problem of stability became available.

Aging experiments of samples of Fluidextract of Ergot containing 2% to 2.5% of buffer salts and reducing and oxidizing agents show some interesting results.

Fluidextract, with sodium dihydrogen phosphate, and reducing agents, sodium dihydrogen hypophosphite and sodium hydrosulphite, show questionable results; whereas, fluidextracts with oxidizing agents, potassium chlorate, potassium dichromate and potassium permanganate, show complete loss of potency after six months' aging.

The hydrogen-ion concentration factor in these experiments, together with a more complete report of the above data, will be discussed later in another article.

EXPLANATION OF ILLUSTRATIONS.

Figure I represents an isolated rabbit uterus (whole uterus) the upper curve one horn and the lower curve the other horn of the same uterus. Each strip is immersed in 100-cc. cylinders. Epinephrine injections were given every twenty minutes. The first injection of 0.5 cc. (1–200,000) ergotamine tartrate in the 100-cc. cylinder represents a dilution of 1–40,000,000 of ergotamine tartrate. This dose produced an inhibition of 16% for the upper strip and 62% for the lower strip. As shown in the figure, the inhibiting effects of the alkaloid disappeared in 20 to 40 minutes. The second injection of ergotamine 0.5 (1–200,000) or 1–40,000,000 dilution plus the same dilution of histamine produced an inhibition of 17% for the upper strip and 58% for the lower strip. Apparently, the same concentration of histamine as ergotamine did not antagonize or aid the inhibitory effects of ergotamine. The third injection to the upper strip of ergotamine, same dilution as the previous injections, with the same dose of tyramine, showed no change in the action of ergotamine. The lower strip with ergotamine and choline (1–100) or 1–10,000 dilution, did not show the same inhibitory effect. Apparently, choline 2000 times the concentration of ergotamine,

prevents the inhibitory effect of ergotamine. The last injection of ergotamine produced an inhibition of 20% for the upper strip and 50% for the lower strip. Thus doses of histamine, tyramine and choline equal to that of ergotamine, appear not to aid or antagonize the inhibitory action of ergotamine.

Figure II represents an isolated rabbit uterus (whole uterus) the upper tracing one horn and the lower tracing the other horn. Each strip is immersed in 100-cc. cylinders. Epinephrine injections were given every twenty minutes. The first inhibition represents ergotamine tartrate 0.5 cc. (1–200,000) or 1–40,000,000 dilution. The second inhibition was a mixture of equal parts of ergotamine tartrate and histamine phosphate. The third inhibition was ergotamine and tyramine equal parts to upper tracing, and ergotamine and acetyl-choline equal parts to lower tracing. The last inhibition represents ergotamine alone.

Thus apparently equal parts of histamine, tyramine and acetyl-choline with ergotamine do not prevent or aid the inhibitory effects of ergotamine.

Figure III represents a whole isolated uterus of a rabbit. The upper and lower tracings are the two horns or fallopian tubes. These strips were immersed in 100-cc. cylinders containing Locke-Ringer solution. The first inhibition of 18% and 16% was due to ergotamine tartrate 0.5 cc. (1–200,000) or 1–40,000,000. The second inhibition of 16% and 19% was obtained by the injection of solution "M" which is a mixture of one part of ergotamine and two parts of histamine, tyramine and acetyl-choline. The remaining figures are alternating doses of ergotamine alone and a mixture of ergotamine and the three amines.

Thus the amines in a concentration twice that of ergotamine apparently does not influence the action of ergotamine.

Figure IV represents a whole isolated rabbit uterus. The upper and lower tracing are the two horns or fallopian tubes. This uterus after each dose of alkaloid returned to normal or responded to epinephrine stimulation partially in 20 minutes and completely in 40 minutes. The doses marked "T" represent Ergotamine Tartrate Tablets (Sandoz). The inhibition of these tablets was 60% and 58% for the upper tracing and 45% and 64% for the lower tracing, or an average inhibition of 56.75%. The doses marked "A" represent Ergotamine Tartrate Crystals (standard solution). The inhibition of this standard solution "A" was 67% and 67% for the upper tracing and 67% and 77% for the lower tracing, or an average of 69.5%.

Thus the tablets (Ergotamine Tartrate No. 62128 Sandoz) assay 81.65% of the standard crystals of ergotamine tartrate.

Figure V represents a whole uterus, one horn only. F. E. Ergot U. S. P. (*A*) is the control. F. E. Ergot U. S. P. (*B*) is the same as F. E. Ergot (*A*) except that a current of air was passed through for 48 hours. The average inhibition for "A" was 35½% and the average inhibition for "B" was 33% or "B" assayed 93% of "A" or a loss of only 7% by 48 hours of aeration.

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A PHARMACOLOGICAL NOTE ON CIMICIFUGA.

BY DAVID I. MACHT AND HELEN M. COOK.

INTRODUCTORY.

Cimicifuga, popularly known as Black Cohosh, Black Snakeroot, Rattleroot, Rattlesnake Root, Bugbane, Bugwort, Squaw Root and Macrotys, is the dried rhizome and root of *Cimicifuga racemosa*, of the family of the *Ranunculaceæ*. This drug has enjoyed considerable vogue in the United States, and it was official in the British Pharmacopœia but dismissed from it in 1914. A number of its fluid preparations are still recognized in America and the resin obtained from cimicifuga, known as cimicifugin, or macrotin, can also be found on the market. In addition to the resin, which can be obtained in impure form by precipitating a saturated tincture of the root with water, cimicifuga contains a volatile oil and a bitter neutral substance. This drug was introduced into medical practice a hundred years ago by Young (1). In addition to Young's paper on cimicifuga, there is another early reference to this drug by N. S. Davies (2).

Cimicifuga preparations have been recommended for a number of different conditions. Sir Lauder Brunton recommends it as a stomachic, cardiac tonic and expectorant (3). The eighteenth edition of Hare's "Practical Therapeutics," published in 1922, cites as indications for its use the following clinical conditions: rheumatism, chronic bronchitis, chorea, amenorrhea and subinvolution and tenderness of the womb (4).

Even the earlier editions of Osler's "Principles and Practice of Medicine" recommended the use of cimicifuga in St. Vitus' dance, or chorea (5). In spite of these various indications to be found in books on therapeutics, there is no scientific experimental work on record concerning the pharmacology of Snakeroot. In connection with a study of various drugs, old and new, purported to exert an effect on uterine muscle, the present author has made an experimental investigation of the fluidextract of cimicifuga and of cimicifugin; and the results obtained are briefly recorded in this place.

Inasmuch as cimicifuga has been principally recommended as a stomachic, a specific for chorea and as an "uterine tonic," the author in performing his experiments was chiefly concerned with: 1, the effects of cimicifuga on cerebral convulsions and on neuromuscular coördination; 2, the effects of the drug on the intestinal movements; and 3, its action on the uterus.

EFFECTS ON THE BRAIN AND NEUROMUSCULAR APPARATUS.

Since cimicifuga has been especially recommended in chorea, or St. Vitus' dance, two series of experiments were undertaken to ascertain its possible effects on the brain and on neuromuscular coördination, on the one hand, and convulsions, on the other. In order to study the effects of cimicifuga on the brain, psychopharmacological experiments were made with white rats. The method used has been described by the writer in various papers. Albino rats are trained to run in the circular maze and reach its center in the shortest time possible without an error. White rats of good pedigree can be trained to solve the maze problem in two weeks and, when they have done so, are ready for the study of pharmacological agents. The running time and behavior of an individual rat are determined before administration of the drug. The animal is then given the drug to be studied, and at intervals of fifteen minutes thereafter is tested to ascertain its psychological activity, muscular coördination, etc. Since fluidextract of cimicifuga could not be given by injection, it was necessary to administer the drug by a specially constructed "stomach tube" devised by the author. With such an instrument in expert hands, the drug can be introduced with impunity into the stomach of a rat without the use of an anæsthetic. With a fine tuberculin syringe the solution is then injected into the stomach. In the present research, trained rats were selected and given 0.1 cc. of the fluidextract of cimicifuga diluted with 0.9 cc. of water. Control experiments were made with similar quantities of 95 per cent ethyl alcohol diluted with ten times its volume of water. The results obtained were very interesting. When rats weighing about 300 Gm. were given 0.1 cc. of 95 per cent alcohol in 0.9 cc. of water by stomach tube, no effect whatever was noted on their psychological activity. Neither the brain nor the neuromuscular apparatus was depressed after such doses of alcohol. When 0.2 cc. of a 95 per cent solution of ethyl alcohol was so administered, a mildly depressant effect was noted. When 0.1 cc. of fluidextract of cimicifuga was diluted with water and introduced in the rat's stomach in the same way, no sign of either depression or excitement was observed. However, a distinctly depressant effect, which lasted about two hours, was produced by doses of 0.2 cc. of the fluidextract. The following protocols illustrate the psychopharmacological experiments described above.

PSYCHOPHARMACOLOGICAL EXPERIMENTS (FEBRUARY 25, 1932).

Rat *No.* 1—weight, 250 grams: normal running time, 5.3 seconds; no errors.
Given 0.1 cc. of fluidextract of cimicifuga by stomach tube.
Running time 1/2 hour later, 5.6 seconds; no errors.
Running time 1 1/2 hours later, 6.0 seconds; no errors.

Rat *No.* 2—weight, 250 grams: normal running time, 15.3 seconds; no errors.
Given 0.2 cc. of fluidextract of cimicifuga by stomach tube.
Running time 1/2 hour later, 26.6 seconds; one error.
Running time 1 1/2 hours later, 26 seconds; no errors.

Albino rats were also used to ascertain whether or not cimicifuga preparations have an inhibitory effect on convulsions. It is well known that camphor, when injected in sufficient quantities in various animals, particularly rats and guinea pigs, produces tonic and clonic convulsions of epileptiform character. Advantage was taken of this convulsant action of camphor in the present problem. Adult rats weighing 300 Gm. or more were given as much as 0.5 cc. of fluidextract of cimicifuga diluted with water by stomach tube. From fifteen to thirty minutes later such rats were injected with camphorated oil in doses of 0.2 cc. (40 mg.) per hundred Gm. weight. As control animals, other rats to which cimicifuga had not been administered were injected with equivalent doses of camphorated oil. It was found that the onset of convulsions, their violence and duration, in no way differed in the two sets of rats. The same convulsions took place in the animals treated with cimicifuga as occurred in the normal rats injected with camphor. In other words, even large doses of cimicifuga extract, 0.5 cc., were not sufficient to inhibit the camphor convulsions, as bromides are known to do, for instance (6). The following protocols will serve as illustrations.

CONVULSANT EXPERIMENTS (FEBRUARY 19, 1932).

Rat *A*—weight, 350 grams.

Given 1.0 cc. (200 mg.) of camphorated oil by intraperitoneal injection.
Four minutes later violent clonic and tonic convulsions commence and continue a long time.

Rat *B*—weight, 380 grams.

Given by stomach tube 0.5 cc. (100 mg.) of fluidextract of cimicifuga diluted with water.
Fifteen minutes later given 1.0 cc. (200 mg.) of camphorated oil by intraperitoneal injection.
Four minutes thereafter violent clonic and tonic convulsions commence and continue a long time.

EFFECT OF CIMICIFUGA ON INTESTINES.

Studies were made of the action of fluidextract of cimicifuga and of cimicifugin on the isolated intestines of rat, guinea pig, rabbit and especially the cat. The method employed was the usual one. Segments of the small intestine, taken either from the ilium or jejunum, were suspended in oxygen and Locke's solution, kept at a constant temperature of 38° C.; and the normal peristaltic contractions were recorded on a slowly moving drum. Various quantities of cimicifuga preparations were then introduced into the chamber of Locke's solution in which the segments were suspended, and the effect on the contractions and the movements of the intestinal muscle was observed. Controls with equivalent doses of alcohol were also made. The results obtained are well illustrated in Figs. 1, 2 and 3. In Fig. 1, a strip of the intestine of the cat was kept alive in oxygenated Locke's solution; and its movements were recorded on a slowly moving kymograph. A suspension of 5 cc. of cimicifugin in physiological saline was introduced into the Locke's solution. It will be noticed that the resin suspension produced no effect whatever on the intestinal contractions. The same preparation was then treated with a 0.5 cc. of fluidextract of cimicifuga introduced directly into the chamber containing 50 cc. of Locke's solution. It will be noted that this produced a primary stimulation of the intestinal contractions. Such a primary stimulation of the intestinal contractions, however, is usually transient. When large doses of the fluidextract are employed, such as are shown in Fig. 2, the intestinal muscle is relaxed and paralyzed. It is

still capable, however, of responding with a contraction to a large dose of pilocarpine. In Fig. 2 is shown the effect of 1.0 cc. of ethyl alcohol introduced into 50 cc. of Locke's solution. It will be seen that no change in the intestinal movements was produced. This was followed by 1.0 cc. of fluidextract of cimicifuga to produce relaxation of the intestinal segment, but not complete paralysis, as shown by its contraction to 4.0 mg. of pilocarpine. Such a depressant effect occurred even after very small doses of cimicifuga. In Fig. 3 is shown the effect commonly produced by fluidextract of cimicifuga on isolated intestines. Here 0.1 cc. of fluidextract produced a distinct relaxation; 0.2 cc. more produced further relaxation and, finally, paralysis and death of the preparation, as indicated by its failure to respond even to 5 mg. of pilocarpine hydrochloride. Such repeated experiments have demonstrated that fluidextract of cimicifuga, studied on the isolated surviving intestines, may

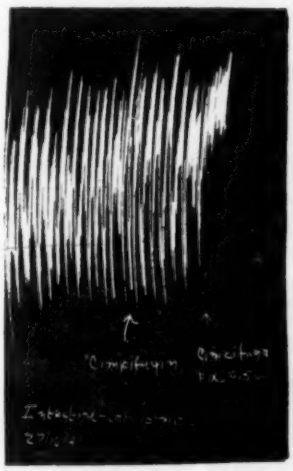

Fig. 1.—Effect of cimicifugin and of fluidextract cimicifugæ on intestine of cat.

Fig. 2.—Effect of larger doses of fluidextract cimicifugæ on intestine of cat.

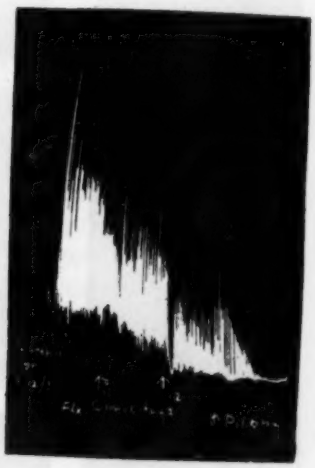

Fig. 3.—Paralyzing effect of repeated small doses of fluidextract cimicifugæ on intestine of cat.

produce a primary transient stimulation of contractions, and this is followed by a relaxation and, finally, paralysis of the intestinal muscle. This is undoubtedly due to the volatile oil contained in the fluidextract, because when similar experiments are made with macrotin or cimicifugin alone no effect of any kind is produced.

EFFECT ON THE UTERUS.

The action of cimicifuga on the uterus is very similar to that on the isolated intestine. Experiments were made on the surviving uteri of the guinea pig and cat. It was found that cimicifugin produced no effect at all on the uterine preparation. Ethyl alcohol alone, given in small quantities, also failed to produce either stimulation or relaxation of the uterine contractions. Fluidextract of cimicifuga, however, produced a primary contraction, followed immediately by relaxation and death of the uterine muscle. Figure 4 illustrates the results obtained. Here the horn of the guinea pig's uterus was first treated with 0.1 cc. of ethyl alcohol introduced in

50 cc. of Locke's solution with no change in the contraction of the uterus. After ten minutes this was followed by 0.1 cc. of fluidextract of cimicifuga, which produced a marked primary contraction of the uterus followed by rapid relaxation and paralysis. After this paralysis the uterine segment failed to respond even to such a powerful stimulant as 1 mg. of ergotoxin.

EFFECT ON CIRCULATION AND RESPIRATION.

In order to complete the pharmacological study of cimicifuga a number of experiments were made to ascertain its effects on the vital organs, the circulation, the respiration and the kidney function. The effect of administration of fluidextract of cimicifuga by mouth to rabbits on the kidney function was negative. Even considerable doses failed to impair the kidney function of rabbits as revealed

Fig. 4.—Effect of fluidextract cimicifugæ on uterus of guinea pig.

Fig. 5.—Effect of small doses cimicifugæ on respiration and circulation of cat.

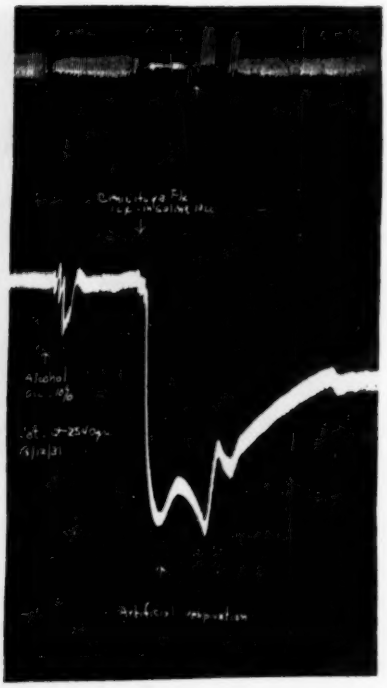

Fig. 6.—Effect of large doses cimicifugæ on respiration and circulation of cat.

by the phenolsulphonphthalein test. The effects on the blood pressure and respiration are illustrated in Figs. 5 and 6. In Fig. 5 are shown the blood pressure and respiratory curves of a cat weighing 3.9 kilo under ether-anesthesia. Fluidextract, 0.2 cc., was injected slowly into the femoral vein. A distinct and prolonged fall in the blood pressure was noted. The respiration, however, was not affected. In Fig. 6 are seen the effects of a larger dose of cimicifuga given by intravenous injection. Here 1.0 cc. of cimicifuga in saline solution was injected. This was immediately followed by a fall of the blood pressure to almost dead level

and paralysis of the respiration. The animal was saved by instituting artificial respiration and an injection of adrenalin. The fall in blood pressure and the effect on the respiration in this case cannot be explained by the amount of alcohol contained in the fluidextract because injection of even larger doses of alcohol alone in such animals produced only a very slight transient fall in blood pressure, if any at all, from which the animal rapidly recovered.

DISCUSSION.

The experiments described above clearly reveal that in the first place the fluidextract of cimicifuga is not an innocuous drug when administered in sufficient quantities and especially by injection. It produces a toxic effect on the circulation and respiration. Studies on the intestines and uterus indicate that cimicifuga extracts exert a depressant and paralyzing effect on isolated organs. Whether the same effect is produced in the living animal by administration of small doses of cimicifuga by mouth is very doubtful. It probably has no effect on either the intestines or uterus in such cases. Very large doses of cimicifuga preparations certainly have no specific effect on the uterus except indirectly through general poisoning of the animal. In this respect cimicifuga may be compared with the so-called emmenagogue oils, studied by the author some years ago (7). It was found that such drugs had no specific effect on the uterus and that when they did exert any action on that organ, it was only one phase of the general poisoning of the victim. As regards the action on the central nervous system, the psychopharmacological (8) experiments recorded above, and also the experiments with camphor, cast great doubt on the usefulness of cimicifuga as a sedative in chorea or similar conditions.

The writer has had occasion to make a survey of about one hundred thousand prescriptions, covering the last thirty years (1900–1931), in the files of the retail department of Hynson, Westcott & Dunning, Inc. These prescriptions were written, for the most part, by prominent medical practitioners in the City of Baltimore. Among the whole number there were certainly not more than a dozen prescriptions calling for cimicifuga or any of its derivatives. It is evident that modern clinical experience furnishes no favorable support for the therapeutic claims of cimicifuga in the earlier literature and agrees with the experimental results of the present investigation.

SUMMARY.

1. Fluidextract of cimicifuga and cimicifugin were studied in regard to their effects on the brain and neuromuscular apparatus, the intestines, the uterus, the circulation, the respiration and kidney function.

2. Even when administered in large doses, cimicifuga exerts very little sedative effect on the brain and neuromuscular apparatus of albino rats, as indicated by their behavior in the circular maze.

3. Large doses of cimicifuga, administered to rats by stomach tube, do not exert an appreciably inhibitory effect on epileptiform convulsions produced by injections of camphor.

4. Cimicifugin exerted no action on isolated surviving preparations of intestinal and uterine muscle. A suspension of the fluidextract of cimicifuga, however; tends to relax and paralyze such muscle preparations, thus indicating a depressant and poisonous property of the oily constituent of the drug.

5. Intravenous injections of suspension of fluidextract of cimicifuga produced marked depression of the circulation and respiration.

6. The results of the present investigation afford no scientific basis for the extravagant claims in regard to the therapeutic value of cimicifuga which are found in some of the old textbooks on medical practice and treatment.

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VEIN ISLETS AS MEANS OF IDENTIFYING DRUGS AND DETECTING ADULTERANTS.*

BY C. J. ZUFALL AND ALLEDA BURLAGE.

If one traces the vein of a leaf as it dwindles in size, he finds that it becomes too small to be seen with the naked eye and finally as he views it under the microscope he finds that it is composed of only one or two vessels which connect with similar branches of other veins. The small area of the leaf enclosed by these smallest branching veins was given the name "vein islet" by Benedict (3).

In some species the vein islet is composed of only a few cells while in others it is composed of many. The size of this area, however, in full-grown leaves, is fairly constant for any species of plant, as shown by Zalenski (1), Shuster (2), Benedict (3), Levin (4) and Ensign (5).

In 1929 Levin (4) used the size of vein islets to distinguish between drugs of closely related species. His work included the several species of Barosma, Erythroxylon, Cassia and Digitalis, and is the most reliable investigation of the subject. This led us to extend the investigation into the detection of adulteration and substitution of other drugs.

The investigators referred to above used various methods of determining the size of the vein islets, most of which were long and quite tedious. Zalenski measured the "combined length of the veins in one square millimetre." Benedict (3) made photographs of the leaves by means of an enlarging camera and counted the vein islets. Ensign showed that Benedict's method was inaccurate because, in uncleared leaves, the chlorophyll hides the minute veins in from 17 to 62 per cent of the cases. Ensign concluded "that any study of leaf venation made from uncleared leaves is wholly unreliable" (5).

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* Scientific Section, Miami meeting, 1931.

Benedict once made the statement that the venation of a full-grown leaf from a young tree differed from that of an older tree. Ensign made studies of the venation in leaves of a grape and of grape fruit which disproved Benedict's statement.

Levin's method was as follows: First, the leaves were cleared with a solution of chlorinated soda and then in chloral hydrate solution; then "at a definite magnification the image of the leaf was projected by means of a series of prisms on to a horizontally placed sheet of paper, upon which a rectangular area representing 4 square millimetres of leaf surface had been traced. The islets which fell within this area were counted and from this figure the average area of one vein islet was determined" (4).

We do not question the accuracy of Levin's method but it is tedious and complicated, and there is a possibility of error.

PROPOSED METHOD OF DETERMINING THE VEIN-ISLET NUMBER.

Two pieces of the leaf were obtained in the following way: Each end of the leaf was cut off at a point one-fourth of the distance from tip to base and discarded; the

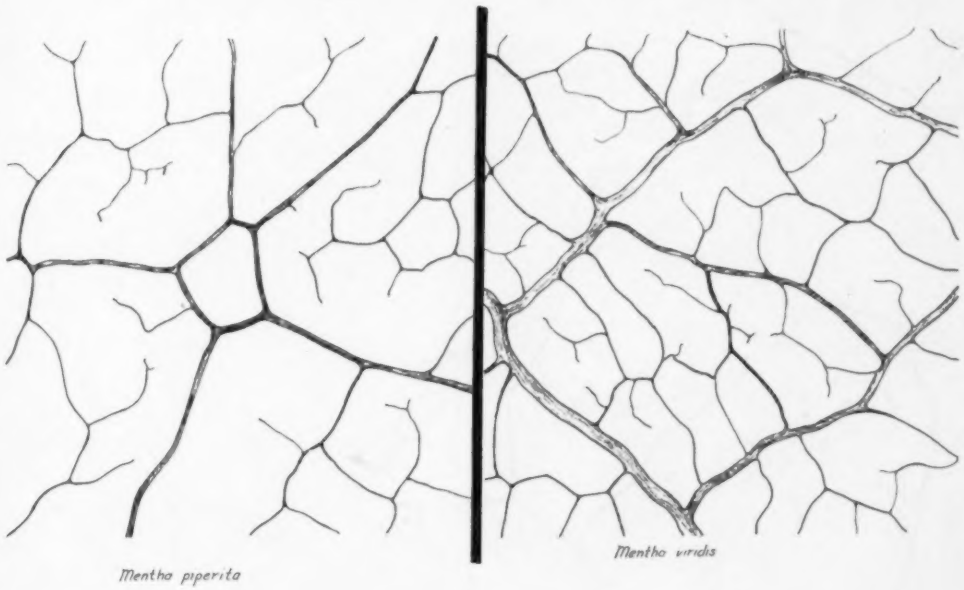

Fig. 1.

piece left was cut down the midrib and from each side a piece was obtained by cutting away one-fourth of the outer edge and one-fourth next to the midrib.

These areas were used because in them the vein islets were found to be more nearly uniform in size. The vein islets next to the midrib are larger than in the other regions, while in the margins of some leaves no vein islets are found. Consequently the above method of discarding the margins and the areas near the midrib avoids the use of the irregular areas.

These pieces were cleared in either chloral hydrate solution or solution of chlorinated soda. Some leaves are cleared more easily than others, so one must determine for each leaf which clearing solution to use. We found that most of the

leaves studied became quite clear by heating in chloral hydrate solution. The leaves may be mounted in the chloral hydrate solution and, since the strip of leaf is often too long for a cover glass, a thin slide may be used to cover it.

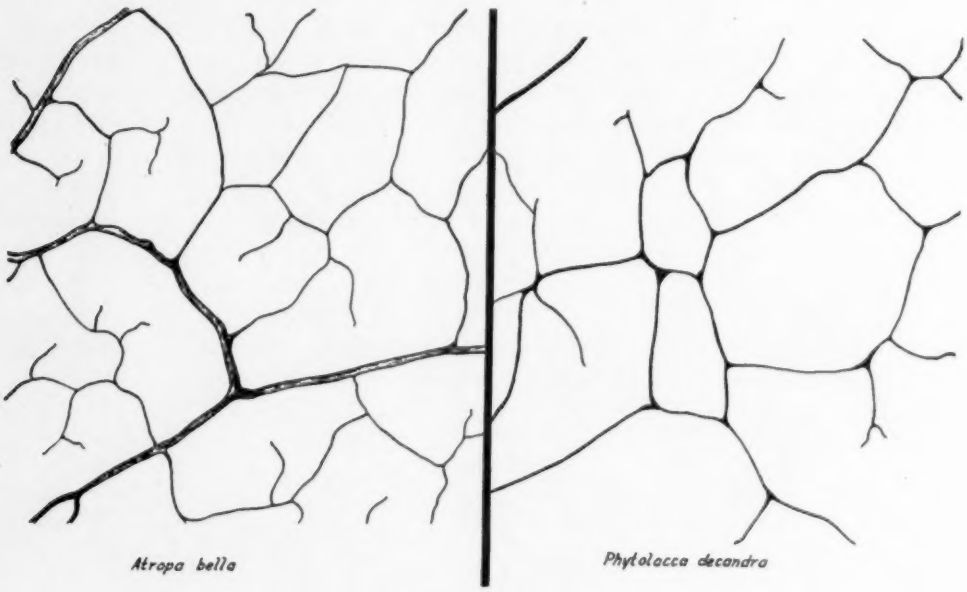

Fig. 2.

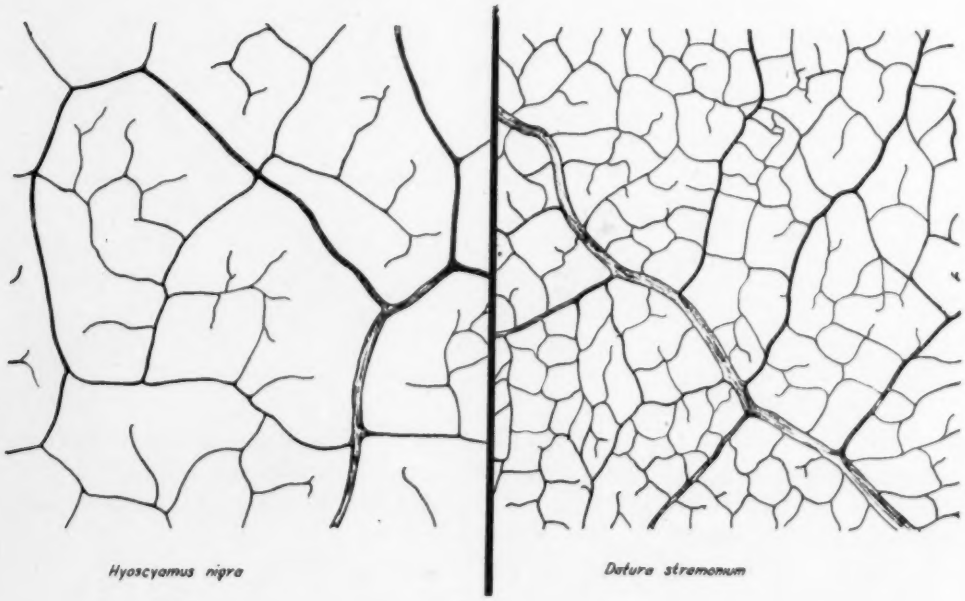

Fig. 3.

The area of the vein islet may be determined by counting the number of vein islets within the field of the 16-mm. objective. The number of vein islets in the field divided by the area of the field in millimetres gives the area of the vein islet.

We found a microscope whose 16-mm. objective gave a field whose area was 2.01 square millimetres. This was near enough the whole number 2, so that the "vein-islet number" could easily be calculated.

The term "vein-islet number" was coined by Levin (4) which he defined as "the number of vein islets in a square millimetre."

In our method we used a mechanical stage and thereby covered the entire piece removed from the leaf. The vein islets in each field were counted, and the average number per field for the leaf determined. The number of fields counted varies from about 20 to 100 per leaf. This number divided by 2 (because the area of our field was 2 square millimetres) gives the number of vein islets per square millimetre or the "vein-islet number." Of course, several leaves of each species were counted in this manner in order to make the determination represent the species.

We believe that this is a simpler, more direct and shorter method than any heretofore suggested for determining the size of vein islets of leaves. It is so simple that undergraduate students in microscopy find no difficulty in using it.

We have applied the vein-islet method to distinguish between the leaves of *Atropa Belladonna* and the leaves of *Phytolacca decandra*. The latter being often used to adulterate the former. The average vein-islet number of Belladonna is 5.27 while that of Phytolacca is 2.57. With the vein islet of Phytolacca twice the size of that of Belladonna, these two leaves can easily be distinguished by this method. The contrast between the two is shown in slide No. 1 which was made from camera lucida drawings, the magnification being the same in each case.

The leaves of Stramonium and Hyoscyamus are often confused. The average vein-islet number of Datura stramonium is 25.7 while that of Hyoscyamus is 11.8. Slide No. 2 shows the contrast between these two.

Slide No. 3 was made from camera lucida drawings of the vein islets of *Mentha piperita* and *Mentha spicata* and shows how this factor can be used to distinguish between the mints. The vein-islet number of *Mentha spicata* was found by us to be 17.8 while that of *Mentha piperita* is 5.78.

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GINSENG EXPORTS FROM UNITED STATES.

Exports of ginseng from the United States, destined principally to China through Hong Kong, gained from approximately 202,800 pounds valued at $1,877,000 in 1930 to 260,500 pounds worth $1,896,000 in 1931. Reports from China indicate a continued large consumption during the past year, fair profits having been realized by local dealers notwithstanding unfavorable exchange. Hong Kong ginseng dealers requested on February 17, 1932, that importers delay deliveries for one month owing to unsettled conditions of the North China market. (Assistant Trade Commissioner David M. Maynard, Hong Kong.)

A TOXICOLOGICAL INVESTIGATION OF MORPHINE AND COCAINE.*

BY L. W. RISING AND E. V. LYNN.

Of the common alkaloidal poisons causing death, strychnine is used most frequently. It is, however, an extremely stable substance, easily isolated and identified, hence presenting no particular problem to the analyst. Next in the order of frequency, morphine and cocaine, in the sequence named, are the direct causes of death, either intentional or accidental. Both of these drugs have been the subjects of controversy when their stability in contact with biological material and when other points pertinent to legal medicine were considered.

It was decided to investigate the poisons quantitatively, in order to secure data which would in part settle these questions. It was especially hoped that the study would yield information indicating the probable rate of disappearance of both drugs in a body after death, the analytical significance of preservatives present, and of putrefaction. The general plan of the work was that followed in the initial investigation of this series (1).[1]

Selection of analytical procedures, particularly for morphine, from the maze of published methods was a difficult task. Morphine has long presented a problem to analysts. None of the great number of technics for its determination seem to have attained general favor, probably because it is difficult with any one of them to obtain concordant results. The method finally worked out is a colorimetric one. The material containing the morphine is finely divided, treated with 2% tartaric acid solution, and heated 30 minutes to an hour on a water-bath at a low temperature. On cooling, the substance is filtered, thoroughly washed, evaporated to a thick syrup, and sodium bicarbonate is added until a slight excess is present. The morphine tartrate is thus decomposed and the alkaloid freed. The mass is evaporated to dryness over a water-bath, powdered in a mortar, extracted with a chloroform-acetone mixture, and the morphine determined colorimetrically. This is

* Scientific Section, A. PH. A., Miami meeting, 1931.

[1] The plan was to subject the poisons as nearly as possible to all of the conditions they might encounter in a body after death. Some of the specimens to be made up for analysis were to be preserved with the common tissue preservative, including embalmer's cavity fluid, and others left unpreserved and allowed to undergo natural putrefaction. Therefore, using stomachs from freshly killed sheep as carriers for the drugs, a series of small, wide-mouthed bottles were set up, each containing a weighed quantity of minced stomach together with a known amount of one poison and one or no preservative.

The preservatives used were alcohol, a 10% solution of formaldehyde, a 1% solution of mercuric chloride, a saturated solution of arsenous acid, and embalmer's cavity fluid. The formula for the cavity fluid is approximately as follows:

Absolute alcohol	(Volume)	35.00 per cent
Methyl alcohol	(Volume)	14.70 per cent
Glycerin	(Volume)	2.00 per cent
Ethereal constituents	(Volume)	4.00 per cent
Water and other constituents	(Volume)	44.30 per cent

All bottles were stoppered and sealed with paraffin except one set of the unpreserved samples which were to be partially exposed to the elements. In all, enough specimens were arranged so that there were three complete sets of bottles containing the poison in contact with one or no preservative. This permitted, during the period of the investigation, three quantitative determinations of the poisons under every condition considered.

carried out by comparing the color from a known sample with the color obtained by treating with Marquis reagent. The principle of the procedure is the same as that practiced by Morgulis and Levine (2).

One of the greatest difficulties in the determination of morphine by this method is its extraction from even simple contaminating agents such as sodium bicarbonate. Cold chloroform-acetone extraction must be repeated 15–20 times before removal is complete. Hot extraction necessitates at least seven attempts.

TABLE I.—RESULTS OF ANALYSES OF MORPHINE-BEARING SPECIMENS.

Set Number.	1.	2.	3.	4.	5.	6.	7.
Preservative % found in.	Alcohol.	HCHO.	$HgCl_2$.	As_2O_3.	Cav. Fld.	Unpreserved. Exposed.	Unexposed.
1.	89	92	94	85	90	91	79
2.	70	82	81	80	63	85	73
3.	58	53	52	55	60	69	62

1. Per cent recovered at the end of one month.
2. Per cent recovered at the end of three months.
3. Per cent recovered at the end of seven months.

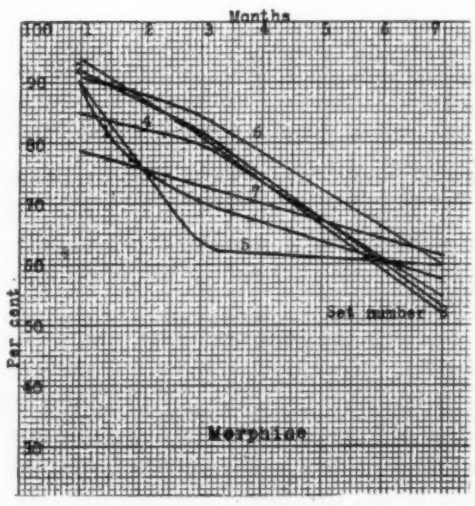

Fig. 1.—Morphine.

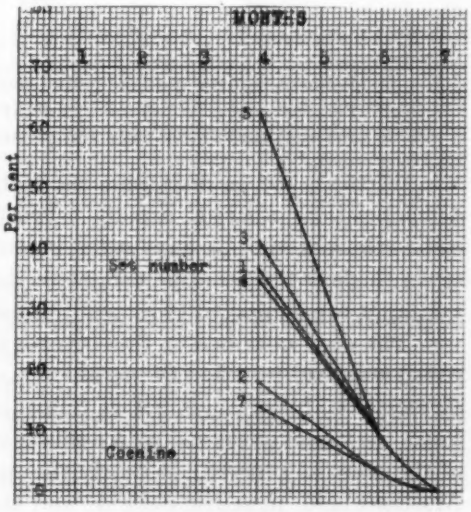

Fig. 2.—Cocaine.

Much has been written about the stability of morphine under various conditions. That opinion is divided is well illustrated by two typically diverse statements: Woodman and Tidy (3) isolated morphine from the stomach of a body after it had been exposed in an unfinished house for four months. Ogier (4), in contrast, states that he has frequently been unable to detect the drug after exposure in viscera putrefied from two to four weeks.

It is certain that morphine can be detected in a body for approximately a year after death, regardless of the condition of the tissue or the presence of the ordinary preservatives. Decomposition sets in immediately and continues more or less gradually until the alkaloid is entirely destroyed. This should require a little more than a year. The rate of decomposition is affected very little by the agents used to prevent putrefaction. If there is any real effect, it is an accelerating, rather than a

depressing one. It is doubtful that an analyst can recover over 50 per cent of the alkaloid from any tissue after the latter has stood longer than 8 months. Within a month after ingestion he should isolate 90 per cent or over and within three months probably between 70 and 80 per cent. Aqueous solutions of morphine contain only 4–5 per cent of the original alkaloid at the end of the year.

In order to isolate the cocaine for analysis, it was separated from the organic carrier by means of an acid-alcohol mixture, from which the alkaloid was then extracted with chloroform. Before making use of the immiscible solvent, all the acid-alcohol solutions of cocaine were concentrated *in vacuo* at temperatures never exceeding 35–40° C. This made the working quantities of liquids much more convenient. Finally the chloroform extract was allowed to evaporate spontaneously, the alkaloid taken up in an excess of dilute acid, and the excess determined by means of a standard alkali.

TABLE II.—RESULTS OF ANALYSES OF COCAINE-BEARING SPECIMENS.

Set number.	1.	2.	3.	4.	5.	6. Unpreserved.	7.
Preservative % found in.	Alcohol.	HCHO.	$HgCl_2$.	As_2O_3.	Cav. Fld.	Exposed.	Unexposed.
1.	37	18	41	35	63	13	14
2.	9	3	9	9	9	..	3
3.	0	0	0	0	0	0	0

1. Per cent recovered at the end of four months.
2. Per cent recovered at the end of six months.
3. Per cent recovered at the end of seven and one-half months.

Witthaus (5), in discussing the stability of cocaine after death, states that its decomposition proceeds rapidly. Proelss (6) found that it is not detectable in cadaveric material 14 days after ingestion. The bulk of the literature, in fact, tends to show that cocaine cannot be detected or estimated unless the organs containing it are subjected to almost immediate analysis.

The data obtained in this investigation proves the contrary to be true. Cocaine, when subjected to the action of putrefaction, decomposes rapidly. Complete dissociation, however, is not as immediate as has been generally accepted heretofore. In tissue preserved with a dilute solution of formaldehyde, the disappearance of the alkaloid proceeds at nearly the same rate as it does in the putrefied samples. Arsenous acid, mercuric chloride and alcohol, retard the dissociation considerably. Approximately 40 per cent of the cocaine was recovered in the presence of these preserving agents at the end of four months. Cavity fluid is the best substance with which to treat a body containing cocaine. The first analysis of tissue in this fluid returned 63 per cent of the poison. In the second series of determinations there was recovered less than 10 per cent of the alkaloid. At the end of the seven and a half months, complete dissociation of the cocaine had taken place. It should not be taken for granted that cocaine is equally stable under all conditions. The experiments conducted here are only indicative of a general trend of dissociation, but they show that it will persist in a body longer than toxicologists have been wont to believe when exposed to the ordinary influences encountered in a corpse.

SUMMARY.

1. Morphine and cocaine have been shown to be more stable in the presence of biologic material, preserved or decomposed, than many toxicologists have believed.

2. The presence of the common tissue preservatives does not interfere with the analysis of these alkaloids.

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STUDIES ON THE DETERMINATION OF CAMPHOR IN CAMPHOR LINIMENT.

III. VACUUM OVEN METHOD.*

BY CHARLES F. POE.

INTRODUCTION.

In previous communications, the author with others (1, 2) has shown that the method given in the U. S. P. X for the determination of camphor in camphor liniment is not accurate. The results were found to be consistently low owing to the fact that the oil was oxidized during the heating process and consequently gained in weight. The investigation covered by this paper proposes a more accurate method for the determination of camphor in the liniment by means of the vacuum oven.

EXPERIMENTAL.

The materials and methods of preparation of the liniments were similar to those described in the previous papers (1, 2). The vacuum oven used was the latest type of the Freas constant-temperature vacuum oven.

A sample of camphor liniment containing 20 per cent camphor was selected for the first tests. Determinations were made using the vacuum oven and also the ordinary air oven according to the U. S. P. X method. A number of dishes made of different materials were used for the determination of the camphor and for the heating of the cottonseed oil. Table I gives the results of this series of tests.

TABLE I.—COMPARISON OF THE DETERMINATION OF CAMPHOR BY THE U. S. P. X AND VACUUM OVEN METHODS USING VARIOUS DISHES. 20 PER CENT CAMPHORATED OIL USED. 4 HOURS' HEATING.

	Air Oven 110° C. Camphorated Oil.			Vacuum Oven 100° C. Camphorated Oil.		
*	Camphor, per cent found.	Variation.	Oil alone, per cent gain.	Camphor, per cent found.	Variation.	Oil alone, per cent gain.
A	19.38	−0.62	0.95	19.74	−0.26	0.18
G	19.53	−0.47	0.82	19.89	−0.11	0.04
L	19.72	−0.28	0.50	19.92	−0.08	0.08
N	19.66	−0.34	0.56	19.81	−0.19	0.06
Pt	19.62	−0.38	0.54	19.86	−0.14	0.07
P	19.52	−0.48	0.74	19.88	−0.12	0.08

* Presented before the Scientific Section, A. PH. A., Philadelphia meeting, 1926, and Miami meeting, 1931.

TABLE I.—*Continued.*

*	Air Oven 110° C. Camphor, per cent found.	Variation.	Oil alone, per cent gain.	Vacuum Oven 100° C. Camphor, per cent found.	Variation.	Oil alone, per cent gain.
S	19.63	−0.37	0.75	19.82	−0.18	0.12
Ag	19.54	−0.46	0.62	19.85	−0.15	0.14
T	19.60	−0.40	0.66	19.92	−0.08	0.06

* Abbreviations of kind of dish: Aluminum, A; Glass, G; Lead, L; Nickel, N; Platinum, Pt; Porcelain, P; Silica, S; Silver, Ag; Tin, T.

As may be seen from Table I, the variation from the standard for the vacuum oven method is much less than for the official method. Also the gain in weight for the oils alone was not nearly so great with the vacuum oven method. There was considerable variation for the different dishes used, especially with the official method, aluminum dishes giving the greatest error.

A number of other samples of liniment, made from different cottonseed oils, were analyzed by both methods. The results are recorded in Table II.

TABLE II.—COMPARISON OF THE U. S. P. X AND VACUUM OVEN METHODS USING DIFFERENT LENGTHS OF TIME FOR HEATING.

*	Dish Used.	Per Cent Camphor Found. Air Oven 110° C. 2 hours.	4 hours.	6 hours.	Vacuum Oven 100° C. 2 hours.	4 hours.	6 hours.
25/6	P	24.21	24.28	24.07	24.32	24.60	24.84
..	S	24.68	24.56	24.22	24.47	24.55	24.81
..	T	24.26	24.38	24.12	24.05	24.75	24.86
..	A	24.40	24.14	23.80	24.60	24.60	24.68
10/7	P	9.66	9.60	9.60	9.46	9.88	9.95
..	S	9.76	9.84	9.64	9.14	9.88	9.89
..	T	8.76	9.60	9.68	9.34	9.79	9.88
..	A	9.46	9.26	9.28	9.37	9.41	9.80
10/8	P	8.98	9.48	9.18	9.32	9.52	9.84
..	S	9.65	9.67	9.17	9.47	9.58	9.93
..	T	9.42	9.55	9.06	9.28	9.67	9.96
..	A	9.46	9.30	8.66	9.28	9.66	9.75
10/9	P	9.46	9.48	9.36	9.10	9.62	9.86
..	S	9.64	9.68	9.25	9.24	9.70	9.81
..	T	9.20	9.25	9.20	9.27	9.67	9.88
..	A	9.35	9.21	8.89	9.50	9.52	9.80
20/13	P	19.69	19.14	19.10	19.45	19.61	19.80
...	S	19.60	19.46	19.20	19.50	19.08	19.79
...	T	19.48	19.54	19.28	19.52	19.78	19.94
...	A	19.40	19.26	19.10	19.56	19.50	19.56
20/14	P	19.58	19.60	19.36	14.92	18.46	19.80
...	S	19.52	19.66	19.42	15.96	18.90	19.83
...	T	18.92	19.48	19.18	16.35	19.49	19.85
...	A	19.34	19.70	19.00	17.82	19.72	19.82

* First figure in this column refers to sample per cent of camphor, second number to number of oil used; the letters: P = porcelain; S = silica; T = tin; A = aluminum.

The same conclusions may be drawn from Table II as from Table I. The variation at the end of six hours for the official method was from 0.32 to 1.34 per cent, whereas that for the vacuum oven method was from 0.04 to 0.32 per cent. The use of aluminum dishes in these experiments also was found to be unsatisfactory.

A larger number of oils were next selected. These were tested for gain in weight by both methods, using tin dishes. The results which showed less gain in weight when the oils were heated in the vacuum oven are given in Table III.

TABLE III.—CHANGE IN WEIGHT WHEN COTTONSEED OILS ARE HEATED ALONE.

No. of Oil.	Air Oven 110° C. 2 hours.	4 hours.	6 hours.	Vacuum Oven 100° C. 2 hours.	4 hours.	6 hours.
1	+0.44[a]	+0.54	+0.60	0.00	+0.06	+0.15
2	+0.63	+0.80	+1.02	−0.04	+0.04	+0.07
3	+0.31	+0.53	+0.81	−0.04	+0.05	+0.08
4	+0.32	+0.54	+0.81	0.00	0.00	+0.08
5	+0.35	+0.47	+0.64	+0.04	+0.06	+0.13
6	+0.18	+0.26	+0.28	0.00	+0.02	+0.08
7	+0.48	+0.71	+1.12	+0.04	+0.08	+0.20
8	+0.24	+0.42	+0.98	+0.08	+0.12	+0.14
9	+0.36	+0.47	+1.08	+0.08	+0.10	+0.12
10	+0.48	+0.64	+0.88	0.00	0.00	+0.06
11	+0.60	+0.78	+0.96	+0.04	+0.04	+0.10
12	+0.52	+0.68	+1.00	+0.10	+0.12	+0.18

[a] Results expressed in per cent.

During one set of determinations after the samples were heated for six hours in an ordinary air oven, they were placed in a desiccator. Other work prevented the weighing of these samples for several days. When the weights were taken, it was noticed that the results were abnormally low. A set of experiments was, therefore, conducted in order to determine whether the samples gain weight on standing. The results for different samples of oil are given in Table IV.

The results in Table IV indicate that samples of oil after being heated gain in weight upon standing, either in air or in a desiccator. Apparently the oxidation is

TABLE IV.—EFFECT OF EXPOSURE TO AIR OF OIL AFTER HEATING IN AIR OVEN.

Treatment of Oil.	Number of Oil Used. 2.	7.	8.	9.	10.	12.
Stood in air 2 hrs. (before heating)	0.00[a]	0.00	0.00	0.00	0.00	0.00
Heated 2 hrs.	0.36	0.28	0.34	0.32	0.20	0.35
Stood in air 2 hrs.	0.44	0.36	0.40	0.38	0.30	0.40
Heated 2 hrs. more	0.66	0.58	0.59	0.58	0.43	0.61
Stood in air 24 hrs.	0.94	0.84	0.84	0.86	0.68	0.88
Stood in desiccator 24 hrs.	1.04	0.94	0.90	0.96	0.78	0.98
Heated 2 hrs. more	1.18	1.22	1.00	1.12	0.86	1.20
Stood in desiccator 24 hrs.	1.60	1.48	1.34	1.44	1.02	1.42
Stood in air 24 hrs.	1.78	1.64	1.44	1.62	1.18	1.61
	Regular Heating.					
2 Hrs.	0.12	0.18	0.22	0.24	0.16	0.28
4 Hrs.	0.56	0.48	0.60	0.56	0.49	0.69
6 Hrs.	0.80	0.82	0.80	0.84	0.54	0.94

[a] Results expressed in percentage gain in weight.

hastened with the aid of heat, since the original oils showed no gain when exposed to air before heating. Similar experiments were made on samples of oil heated in the vacuum oven. The results were similar except the oxidation was not so great.

About the same results were noted when the residues from the determination of camphor were allowed to stand in air and in the desiccator.

Up to this point, it appears that six hours' heating in the vacuum oven at 100° C. is necessary to drive off all the camphor. Experiments were conducted in order to try to reduce the time required for the determination. Analyses were made on a series of samples at different temperatures. The results are recorded in Table V.

TABLE V.—EFFECT OF TEMPERATURE ON DETERMINATION OF CAMPHOR BY THE VACUUM OVEN METHOD.

Per Cent Camphor.	Number of Oil Used.	Per Cent Camphor Found. Air Oven 110° C. 2 hours.	4 hours.	6 hours.	Vacuum Oven 100° C. 2 hours.	4 hours.	6 hours.
20	2	19.18	19.36	19.08	19.68	19.78	19.84
20	5	19.40	19.54	19.06	19.40	19.72	19.94
20	7	19.50	19.40	19.18	18.52	19.68	19.96
20	8	18.60	19.26	19.14	18.96	19.60	19.82
20	9	18.32	19.20	19.16	18.62	19.70	19.88
20	10	19.29	19.37	19.25	19.06	19.76	19.86
20	11	19.34	19.28	19.04	18.94	19.84	19.90
20	12	19.62	19.36	19.13	18.28	19.64	19.72

Per Cent Camphor.	Number of Oil Used.	Per Cent Camphor Found. Vacuum Oven 120° C. 2 hours.	4 hours.	6 hours.	Vacuum Oven 140° C. 2 hours.	4 hours.	6 hours.
20	2	19.90	19.92	19.89	19.92	20.04	20.02
20	5	19.99	20.00	20.00	20.02	20.14	20.42
20	7	19.90	19.92	19.90	19.94	20.00	20.18
20	8	19.86	19.90	19.89	19.92	19.94	20.14
20	9	19.92	19.90	19.90	19.76	19.92	20.14
20	10	19.90	19.91	19.90	19.94	20.16	20.24
20	11	19.93	19.92	19.90	19.90	20.04	20.05
20	12	19.86	19.93	18.90	19.92	20.04	20.16

Apparently the oils begin to decompose about 120° C., since the results are somewhat over 20.00 per cent. To confirm this point a number of oils were heated at different temperatures in the vacuum oven. The results which are given in Table VI indicate that some slight decomposition and consequent loss in weight takes place above 120° C. in a number of the oils.

TABLE VI.—CHANGE IN WEIGHT WHEN OILS ARE HEATED IN VACUUM OVEN AT DIFFERENT TEMPERATURES.

No. of Oil.	100° C. 4 hours.	6 hours.	120° C. 4 hours.	6 hours.	140° C. 4 hours.	6 hours.
2	+0.08	+0.12	−0.12	−0.10	−0.20	−0.38
5	+0.12	+0.10	−0.02	+0.04	−0.23	−0.19
7	+0.06	+0.10	+0.02	+0.08	−0.08	−0.02
8	+0.12	+0.14	−0.02	+0.02	−0.10	0.00
9	+0.10	+0.12	0.00	+0.06	−0.00	−0.02
10	+0.06	+0.08	−0.10	−0.12	−0.30	−0.30
11	+0.10	+0.13	−0.03	+0.06	−0.06	+0.04
12	+0.09	+0.15	−0.05	−0.02	+0.04	−0.08

The proposed method may be summarized as follows: Place 5 cc. of camphor liniment in a tared dish, having a diameter of at least 70 mm., weigh accurately, heat at 115–120° C. for two hours in a vacuum oven, cool in a desiccator and weigh. Aluminum dishes should not be used. Also only a few minutes should elapse between the removal of the sample from the vacuum oven and final weighing.

CONCLUSION.

A satisfactory method for the determination of camphor in camphor liniment by the use of the vacuum oven has been proposed.

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ALKALOIDAL REAGENTS.* II. AROMATIC MONOHOMOCYCLIC DERIVATIVES.[1]

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The behavior of seventeen reagents (21, 45), has been determined with a series of the simpler benzene derivatives. Detailed precipitate and color responses are recorded in the accompanying tables. To avoid the confusion of recording the threshold dilutions which just produced color or precipitate reactions with these reagents in terms of numerical values of Molar or Millimolar concentrations, it was decided to use a code, as follows:

a represents a concentration of $M/10$ or 100 Millimolar of a compound which proved to be the threshold concentration producing a reaction. The particular letter or letters designate the color of the solution or of the precipitate.

a represents a threshold concentration of $M/100$ or 10 Millimolar.

a represents a concentration of $M/500$ or 2 Millimolar.

A represents a concentration of $M/1000$ or 1 Millimolar.

A represents a concentration of $M/5000$ or 0.2 Millimolar.

A represents a concentration of $M/10{,}000$ or 0.1 Millimolar.

In general the standard procedure previously described has been followed; however, much of this work was completed before the necessity for more accurate definition of colors was appreciated. Most of the tests gave negative results for color as well as for precipitate formation, but they were made to be certain that there would be no interference in subsequent work. Those tests which are positive, and which later prove characteristic and definite, will be repeated and color findings reported in accordance with the Mulliken nomenclature (44).

1. BENZENE AND HYDROCARBON DERIVATIVES.

Benzene, toluene, *m*-xylene and phenyl-benzene (diphenyl) were tested. Since none of these substances was soluble in water to the extent of 100 millimols per liter, solutions saturated at room temperature were used. All of these substances gave negative results with all of the reagents.

2. PHENOLIC DERIVATIVES.

Detailed results upon the compounds investigated are given in Tables I and II. Pertinent comments found in the literature follow:

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* Alkaloidal Reagents. I, 20 (1931), 1037.

[1] Scientific Section, Miami meeting, 1931.

PHENOL.

Reagent 1: Pollaci (50) reported that an aqueous phenol solution, stratified upon concentrated sulphuric acid, developed a red color at the contact zone.

Reagent 4: Pougnet (51) recommends a mixture of sulphuric acid and formaldehyde as a group reagent for phenols. Thoms (9, 63) observed a purple-red color with phenol.

Reagent 9: Autenrieth (3) reports that a very dilute solution of ferric chloride imparts a blue-violet color to 1:1000 phenol solutions (1000 mg. per liter). In our hands, this test was less sensitive. This test is also known as Deville's or Hirsch's test.

Reagent 12: Results with potassium permanganate are difficult to interpret and too much stress should not be placed upon its apparently great sensitivity.

Reagent 17: Autenrieth (3) heated Millon's reagent with the test solution and reported a distinct red color at a dilution of 1:100,000 (10 mg. per liter). Stronger solutions were reported to give a positive reaction at room temperature. Almen (2) obtained a yellow precipitate, soluble in nitric acid with a red color, from a solution containing as little as 2.5 mg. of phenol per liter. In our hands, no color was obtained with 100 millimolar solutions at room temperature (approximately 10,000 mg. per liter). This test is also called Hoffmann's test.

Other Reagents: (*1*) An excess of bromine water produces a yellowish white crystalline precipitate of tribromophenyl hypobromite with a solution containing as little as 20 mg. of phenol per liter. This test is also positive with cresols and polyphenols (3, 29, 36, 40, 41).

(*2*) Gently warming a mixture of ammonium hydroxide and calcium or sodium hypochlorite solution with phenol gave a blue color. Acidification converted this to red, and basification restored the blue color (2, 3, 5, 6, 16, 26, 33, 47, 56). Ortho- and meta-cresol give a blue color; para-cresol a dirty brownish color.

(*3*) Heating a mixture of sulphuric acid and benzaldehyde with phenol produces a dark red color and precipitate; basification produces a violet-blue color, which is soluble in ether (3, 39). This test is reported to be positive with a solution containing 500 mg. of phenol per liter. Of the three cresols, only ortho-cresol is reported to give this test.

(*4*) Freshly diazotized sulphanilic acid, or a 1:60 solution of diazobenzenesulphonic acid (48) gives a yellow color with phenol (20, 22). Ortho- and meta-cresol similarly give a yellow color, para-cresol a red color by this test.

(*5*) Defacqz heated tungstic acid with sulphuric acid containing a trace of potassium bisulphate, then added enough sulphuric acid to prevent solidification upon cooling. Trituration of this reagent with phenol developed a very intense red color (11).

(*6*) A pine shaving moistened with hydrochloric acid gave a blue color with phenol (55). Tommasi (64) and Hoppe-Seyler (25) use a mixture of hydrochloric acid and potassium chlorate.

(*7*) Upon adding ammonium hydroxide and tincture of iodine to an alcoholic solution of phenol, a green color develops which persists on heating or on acidification with hydrochloric acid (38).

(*8*) On adding phenol to a mixture of molybdic and sulphuric acids, a dark olive-green color appears, which changes to blue, then to violet (10).

(*9*) Stratification of phenol upon sulphuric acid containing nitric acid produces a blue color (34), Linde (35) states red color at the contact zone; if spirit of nitrous ether is used instead of nitric acid, a red color zone forms (15).

DIHYDROXYBENZENES.

Reagent 8: With formaldehyde and sulphuric acid resorcinol gave a yellow color, turning to red and finally to orange (63).

Reagent 9: Brieger (8) obtained an emerald-green color on mixing dilute ferric chloride with pyrocatechol; basification produced a violet color, which returned to green upon re-acidification (13).

Reagent 17: Millon's reagent (also known as Plugge's reagent (3)) gives an orange color with hydroquinone, and a yellow color with resorcinol, upon heating (42).

Other Reagents: (*1*) Upon adding ammonium hydroxide and tincture of iodine to an alcoholic solution of pyrocatechol, a "catechu" color is reported; with resorcinol, "old cognac;" with hydroquinone, a reddish brown color (38).

(*2*) Tungstic acid-sulphuric acid mixture gave a violet-black color with pyrocatechol; with resorcinol, red-brown; with hydroquinone, a very intense amethyst-violet color (11).

(*3*) Pyrocatechol reduces silver nitrate and Fehling's solution upon warming (46). Hydroquinone reduces Fehling's solution at room temperature (60).

(*4*) Fusion of resorcinol with phthalic anhydride, in the presence of zinc chloride, produces fluorescein (17).

(*5*) Seliwanoff (57) detects fructose by the development of a red color and precipitate upon heating with a hydrochloric acid solution of resorcinol. The precipitate dissolves in alcohol, giving a striking red color. Borchardt (7) showed that an alkaline solution of this precipitate in acetic ether was yellow.

(*6*) On heating an alkaline solution of resorcinol with chloroform, an intense crimson color is reported, which changes to pale yellow upon acidification with hydrochloric acid (14, 53, 65).

(*7*) With sodium hypochlorite solution, resorcinol gave a violet color, which changed to yellow on standing (6). Heating caused a change to yellowish red, then to brown. On adding ammonium hydroxide, a violet color developed, which changed to yellow at room temperature, and to dark green on boiling.

(*8*) A mixture of sodium hydroxide and formaldehyde boiled for half a minute with resorcinol, produced a distinct red color. The limit of delicacy for detection of formaldehyde was reported to be 1:10,000,000 (0.1 mg. per liter); the limit for resorcinol was not stated. This has been called Lebbin's test (31).

(*9*) An alkaline solution of 2,6-dibromoquinonechloroimide gave a red color with resorcinol (18, 53).

TRIHYDROXYBENZENES.

Reagent 4: Formaldehyde and sulphuric acid gave a red color with phloroglucinol (63).

Reagent 17: Millon's reagent gives a brown color (42).

(*1*) An alcoholic solution of phloroglucinol and vanillin, heated with free hydrochloric acid, gives a purplish red color (22, 43, 59). This reagent has been called Günzberg's reagent.

(*2*) Phloroglucinol, heated with hydrochloric acid and lignin, arabinose or a pentose, gives a red color (22, 43, 62).

(*3*) Phloroglucinol and pyrogallol reduce Fehling's solution and ammoniacal silver nitrate at room temperature (46, 49).

(*4*) Phloroglucinol added to toluidine and potassium nitrate solution developed a light yellow, opalescent solution which turned to orange, with the development of a cinnabar-red precipitate (67). This test is claimed to be sensitive at a dilution of 1 : 200,000 (5 mg. per liter).

(*5*) With tunstic acid-sulphuric acid mixture, pyrogallol gave a red-black color (11).

(*6*) Upon adding ammonium hydroxide and tincture of iodine to an alcoholic solution of pyrogallol, a black color is produced (38). An aqueous solution of pyrogallol is reported to give a lemon-yellow color (66).

(*7*) Pyrogallol gave a yellowish red color with potassium cyanide solution (19).

CRESOLS.

Some notes have been given under Phenols.

Reagent 8: Thoms (61) states that ortho-cresol gives a combination containing two mols of cresol and three mols of picric acid as orange-yellow needles. Meta- and para-cresols failed to form picrates.

(*1*) Upon adding ammonium hydroxide and tincture of iodine to an alcoholic solution of creosote or of the cresols, a brownish green color is produced (38).

(*2*) Upon complete sulfonation of a mixture of cresols and phenols (containing less than 10% of phenol) and subsequent nitration, meta-cresol quantitatively forms the trinitro derivative; ortho- and para-cresols form oxalic acid (44, 52).

(*3*) A mixture of tungstic acid and sulphuric acid produces an intense red-brown color with para-cresol (11).

(*4*) Sodium nitroprusside and potassium hydroxide produce a reddish yellow color with para-cresol; the addition of acetic acid converts this to light pink (27).

3. AMINO DERIVATIVES.

The compounds tested and results obtained are given in Tables III and IV.

ANILINE.

Reagent 2: With fuming nitric acid, aniline gave a deep blue solution, changing to yellow and to red on heating (24).

(*1*) Crystalline benzene- or toluene-sulfoneamides are obtained by mixing benzene- or toluene-sulphonyl chloride with an amine, in alkaline solution. Derivatives of the primary amines are soluble in alkalies (23, 44).

(*2*) Heating aniline or the toluidines with chloroform in the presence of a strong alkali produces an isonitrile, which has a characteristic disagreeable odor (3, 17, 24, 49).

(*3*) On mixing calcium or sodium hypochlorite solution with aniline, a violet or purplish red color develops, changing on standing to dirty red. Addition of a trace of phenol or ammonium hydroxide yields a stable blue color. The limit of sensitivity is reported to be 1 : 66,000 (16 mg. per liter) (3, 37, 44, 58, 63). Runge (55) claims that ammonium chloride must be absent. Jacquemin (26) treated a solution of aniline with calcium hypochlorite, followed by ammonium sulphide, obtaining a rose-red color, and reported a threshold concentration of 1 : 250,000 (4 mg. per liter).

(*4*) Aniline gives a flesh-colored precipitate with bromine water. The limit of sensitivity of this test is reported to be 1 : 66,000 (16 mg. per liter) (3, 49).

(*5*) Concentrated sulphuric acid mixed with a drop of aqueous potassium dichromate solution and aniline gives a blue color on standing. The addition of water produces an immediate blue color (3, 49). Using a crystal of potassium dichromate, Beissenhirtz (4) obtained a red color, which turned to blue and then disappeared.

(*6*) Aniline reduces gold chloride, precipitating metallic gold (58).

(*7*) Aniline heated with powdered mercuric chloride, gives a rich crimson dye (58).

(*8*) The addition of lead or manganese dioxide to a solution of aniline in sulphuric acid gives a green solution (12, 32).

(*9*) A solution of sodium phosphomolybdate in sulphuric acid or oxalic acid gives a yellow precipitate with aniline, which turns to blue and dissolves in ammonium hydroxide with the formation of a blue solution (24).

(*10*) A mixture of sulphuric acid and potassium ferricyanide gives a blue to purple color with aniline (32).

(*11*) Aniline salts produce a yellow color on pine shavings (55).

DIAMINES.

Reagent 9: Paraphenylene diamine gives a green color with 10% ferric chloride, which rapidly changes to brown, and after a minute or two, to red-violet (44).

(*1*) Bromine water gives a violet precipitate with metaphenylene-diamine (44).

(*2*) Nitrites give a deep yellow color with metaphenylenediamine; the detection of traces of nitrites is possible with this reagent (49).

(*3*) An alkaline solution of α-naphthol in 50% alcohol gives a purple solution with paraphenylene diamine (49).

(*4*) Paraphenylene diamine, mixed with blood and hydrogen peroxide, slowly develops an olive-green color. Upon adding a few drops of acetic acid, the color changes to brownish red (49).

TOLUIDINES.

(*1*) Acetyl chloride gives characteristic crystalline compounds, which serve to differentiate ortho- from para-toluidine. The meta-derivatives must be brominated for use (44).

(*2*) In a mixture of sulphuric acid and nitric acid, paratoluidine gives a blue to violet color, changing to red and finally to brown (30, 54).

DIAMINOTOLUENES.

No reactions were found for the two compounds used.

For 1-CH_3,3,5-diaminobenzene, Mulliken (44) reported a characteristic diacetyl derivative; for 1-CH_3, 2,6-diaminobenzene, a characteristic diacetyl derivative, also a deep blue color with ferric chloride are reported.

AMINODIPHENYLS.

(*1*) The 1-NH_2 compound is reported to form a characteristic acetyl derivative, also a chlorplatinate (44).

(*2*) The 3,8-diamino compound, benzidine, gives a voluminous deep blue precipitate with potassium dichromate (28). It also forms a white precipitate with sulfates, which is very slightly soluble in water.

(*3*) Benzidine, mixed with blood and hydrogen peroxide, gives a blue or blue-green color (1, 3, 43, 49). The limit of sensitivity for blood has been reported as 1 : 100,000 (10 mg. per liter) although we have obtained positive tests with dilutions of 1 mg. per liter (1 : 1,000,000) as well as with weaker solutions under proper conditions.

4. AMINOPHENOLS.

The compounds used and the results observed are recorded in Tables V and VI.

(*1*) Meta-aminophenol forms a deep red picramide with picryl chloride (44).

(*2*) Para-aminophenol combines with benzaldehyde to form a pale yellow crystalline compound (44).

(*3*) The 2,4-diamino compound is precipitated from aqueous solutions of hydrochloric acid by sodium sulfite as leaflets. The picrate forms lemon-yellow needles. The solution in ammonium hydroxide becomes deep blue upon exposure to air (44).

CONCLUSION.

The behavior of seventeen alkaloidal reagents has been determined with substituted benzenes, in which the substituent groups have been alkyl, hydroxyl, phenyl and amino groups, alone or in combination. In addition, characteristic reactions for these compounds found in the literature have been reported.

TABLE I.—PRECIPITATE FORMATION:

	Reagent No.																
Product.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
Benzene																	
1-OH				*rw*													
Dihydroxy																	
1,2 OH			*dg*	*p*	*A*					db						*g*	b
1,3 OH			s	r								*B*				*blw*	W
1,4 OH				*b*	*B*							b				*b*	
Trihydroxy																	
1,2,3 OH				*b*	*B*					*B*						*b*	
1,3,5 OH				ry								b				w	YW
Cresols:																	
1-OH, 2-CH_3		*ry*		w								*b*				*w*	
1-OH, 3-CH_3				w												*w*	
1-OH, 4-CH_3		*ry*		w												*w*	

Reagent 1:	H_2SO_4	Reagent 10:	$K_2Cr_2O_7$	*Key to Code:*	
..... 2:	HNO_3	..... 11:	K_4FeCN_6	*M*/10 or 100 Millimol....	*a*
..... 3:	Froehde's	..... 12:	$KMnO_4$	*M*/100 or 10 Millimol....	a
..... 4:	Marquis	..... 13:	K_2PtCl_4	*M*/500 or 2 Millimol....	a
..... 5:	Mayer	..... 14:	Schiebler	*M*/1000 or 1 Millimol....	*A*
..... 6:	Dragendorff	..... 15:	Uranium acetate	*M*/5000 or 0.2 Millimol....	A
.. . 7:	Wagner	..... 16:	SeO_2	*M*/10,000 or 0.1 Millimol....	A
..... 8:	Picric Acid	..... 17:	Millon		
..... 9:	$FeCl_3$				

A denotes amber; b, brown; bl, blue; d, dark; g, green; p, purple; r, red; v, violet; w, white; y, yellow.

TABLE II.—COLOR FORMATION:

Product.	Reagent No. 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
Benzene																	
1-OH		y	*r*						*p*			B					
Dihydroxy																	
1,2 OH		rY	*B*						*g*	B		*B*			*rb*		
1,3 OH		*Y*							*p*								
1,4 OH												B					
Trihydroxy																	
1,2,3,OH		bY	*b*Y		Y				*By*			B		*RB*	*R*		
1,3,5,OH			rY						v			B					
Cresols:																	
1-OH, 2-CH_3		Y							*g*			B					*r*
1-OH, 3-CH_3		r							*p*			B					*r*
1-OH, 4-CH_3									bl			B					r

TABLE III.—AMINO DERIVATIVES PRECIPITATE FORMATION:

Product.	Reagent No. 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
Benzene:																	
1-NH_2						*w*						*B*					
Diamino:																	
1,2-NH_2							B	*Y*	r	*RB*				*r*			r
1,3-NH_2							*W*		*r*			*b*					W
1,4-NH_2							b	*y*		b				*w*			*w*
Aminotoluenes:																	
1-CH_3, 2-NH_2								*y*									*w*
1-CH_3, 3-NH_2						w	*b*	*y*				*b*					*w*
1-CH_3, 4-NH_2												B					*w*
Diaminotoluene:																	
1-CH_3, 2,5-NH_2																	*w*
1-CH_3, 2,4-NH_2																	*w*
Aminodiphenyl:																	
1-NH_2			*w*	*w*	*w*		*w*b	*y*		*g*	w	r	*w*	w	*w*		*w*
3-NH_2																	Y*
3,8-NH_2	w	*w*	w	*W*		w		*Y*		P	*W*	b	*W*	w			w

TABLE IV.—AMINO DERIVATIVES COLOR FORMATION:

Product.	Reagent No. 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
Benzene:																	
1-NH_2												RB					
Diamino:																	
1,2-NH_2		*R*							*R*Y								
1,3-NH_2		rY							R			*b*Y					
1,4-NH_2		b*Y*							p	*B*		by					
Aminotoluenes:																	
1-CH_2, 2-NH_2		*Y*										bl					
1-CH_3, 3-NH_2												B					
1-CH_3, 4-NH_2												rB					

TABLE IV.—*Continued.*

Product.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
Diaminotoluene:																	
1-CH_3, 2,5-NH_2							g			*G*		g					
1-CH_3, 2,4-NH_2												rb					
Aminodiphenyl:																	
1-NH_2		*Y*									*bl*						
3-NH_2		Y*															
3,8-NH_2		Y	Y						rb			G					

TABLE V.—AMINOPHENOLS PRECIPITATE FORMATION:

	Reagent No.																
Product.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1-OH, 2-NH_2									r								
1-OH, 3-NH_2																	Y
1-OH, 4-NH_2																	
1-OH, 2,4-NH_2										*r*							r

TABLE VI.—AMINOPHENOLS COLOR FORMATION:

	Reagent No.																
Product.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1-OH, 2-NH_2		rY							rY	r*Y*				g			
1-OH, 3-NH_2										r							
1-OH, 4-NH_2		*r*							*p*								
1-OH, 2,4-NH_2		R							R	R		R					R

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RAPE OIL AS AN ADULTERANT OF OLIVE OIL.*

BY REGINALD MILLER AND C. W. BALLARD.

The United States Pharmacopœia X provides specific tests for the detection of cottonseed, sesame and peanut oils in olive oil, as well as constants for specific gravity, saponification number and iodine value for the latter. Owing to the variability of olive oils and natural oils generally, it is necessary that maximum and minimum limits be stated for these constants. Herein lies a possibility for adulteration which is not provided against in the current revision. By skilful manipulation it is possible to add 20–25% of purified rapeseed oil to an olive oil and secure a mixture which will come within the official figures. Olive oils adulterated in this manner have been encountered in the food regulatory work of this laboratory. Admittedly such oils in food commerce need not conform to the pharmacopœial standards, but the very fact that they meet these presumably more stringent requirements increases the difficulties of prosecution. Undoubtedly rapeseed oil was not in vogue as an olive oil adulterant prior to the present revision, hence the omission of specific tests for its presence. A curious legal angle of the situation is the claim that the Pharmacopœia names all likely adulterants for olive oil and provides specific tests for their detection. Reasoning legally along these lines, it was alleged that rapeseed oil was an unlikely adulterant because no mention was made of it in the Pharmacopœia. Possibly such claims might be invalidated by a general notation providing that the naming of specific adulterants in the text of a monograph is not to be construed as limiting the adulterants to those so specified. It is desirable to continue the present procedure and it is manifestly impossible to name all the possible adulterants in the limited confines of the official monograph.

With the exception of the specific gravity and the solidification temperature, the constants of olive and rapeseed oils are sufficient to clearly distinguish one from the other and the several constants are herewith presented:

	Olive Oil.		Rapeseed Oil.
Authority.	U. S. P. X.	"Food Analysis."*	"Food Analysis."*
Specific gravity	0.910–0.915 at 25°	0.915–0.918 at 15°	0.913–0.917 at 15°
Saponification value	190–195	185–196	168–179
Iodine value	79–90	77–95	94–105
Solidification temperature	0°	−6° to +10°	−10° to +10°
Refractive index	.....	1.4659–1.4685	1.4708–1.4723

* "Food Analysis," Leach, 4th Edition.

Investigation by the laboratory showed that it was possible to adulterate olive oil with rapeseed oil and yet have the mixture conform to the constants for pure olive oil. In the determinations a pure olive oil, a purified rapeseed oil and a mixture of 75 parts olive oil and 25 parts rapeseed oil were used. The work was checked by several chemists of the staff and is summarized in part in the following tabulation:

* Scientific Section, A. PH. A., Miami meeting, 1931.

	Olive Oil.	Rapeseed Oil.	Mixed Oils (75 Olive + 25 Rape).
Iodine value	83.5	99.9	87.9
Saponification number	....	....	190.3
Refractive index at 25°	1.4678	1.4720	1.4687
Critical temperature of dissolution or Valenta number	69.2°	83.4°	72.0°

The above results show how closely this mixture of olive and rapeseed oils approaches the constants of a pure olive oil. It will also be noted that figures are stated for the critical temperature of dissolution or Valenta number. In the experience of this laboratory, the Valenta number is the most satisfactory means of detecting this particular adulterant. The details of this test are herewith abstracted from "The Technical Handbook of Oils, Fats and Waxes," Percival J. Freyer and Frank E. Weston, Volume II, 1920, Cambridge University Press.

Prepare a standardized solvent by taking equal volumes 92% ethyl alcohol and pure amyl alcohol and add water until pure almond oil gives a corrected turbidity at 70° C. when tested in the following manner. To 5 cc. of the standardized solvent add an equal volume of the dry oil to be tested; warm until clear; allow to cool and note temperature at which the first sign of turbidity appears during stirring. A correction for acidity is added to the recorded temperature and the result is termed the True Valenta Number.

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A NOTE ON THE TITRATION OF BORIC ACID.*

BY JOHN C. KRANTZ, JR., AND C. JELLEFF CARR.

INTRODUCTION.

The titration of boric acid has warranted the attention of the analytical and physical chemist. The acid in aqueous solution behaves like a weak monobasic acid having a dissociation constant of 6.6×10^{-10} at 25° C. The end-point in titration with alkali occurs at about p_H 11 (1). The change in the hydrogen-ion concentration upon the addition of various types of polyhydric alcohols has been observed for years. Mannitol and glycerin augment the dissociation constant of the acid roughly ten-thousand-fold. This change has been studied by Hildebrand. The properties of the mannitol-boric acid complex were studied by Maugauini (2) in 1890. This investigator emphasized the importance of having the solution of the polyhydric alcohol concentrated and furthermore showed that upon dilution the complex was completely hydrolyzed. Very recently Dodd (3) studied the accuracy of the titration with various indicators and found phenolphthalein the most satisfactory.

Based upon theoretical considerations Prideaux (4) titrated boric acid in aqueous solution using tropeolin O as an indicator. The p_H range of this indicator is approximately 11.1 to 12.7. This investigator determined the p_H of a solution containing equal molar quantities of boric acid and sodium hydroxide and found it to be approximately 11. He titrated boric acid in 0.2 to 0.3 molar solution, using about 0.2 cc. of 0.04 per cent solution tropeolin O as an indicator. His results were

* Scientific Section and Section on Practical Pharmacy and Dispensing, A. PH. A., Miami meeting, 1931.

concordant. Likewise upon theoretical considerations nitramine (picrylmethylnitramine) should also serve as an indicator for the titration of boric acid in aqueous solution.

These methods were studied to determine their applicability as a Pharmacopœial method.

EXPERIMENTAL.

A solution of boric acid of U. S. P. purity was prepared 1.250 Gm. in 25 cc. Twenty-five cubic centimeter portions of this solution were titrated with carbon dioxide free sodium hydroxide solution in normal concentration. Glycerin neutral to phenolphthalein was employed throughout. One series was run by the present U. S. P. method, another by the method of Prideaux using tropeolin O as an indicator and a third by adding glycerin to discharge the pink color produced by phenolphthalein at the end-point and further titrating until it re-appears. This modification (5) was suggested to the Pharmacopœia Revision Committee by the Pacific Coast Borax Company.

TABLE I.

	I. U. S. P. Method Gm. Found.	II. Modified U. S. P. Method, Gm. Found.	III. Aqueous Solution Method, Gm.	III. Using Tropeolin O Found.
1.	1.220	1.234	1.261	1.242
2.	1.220	1.240	1.259	1.270
3.	1.232	1.248	1.252	1.262
4.	1.252	1.240	1.252	1.255
5.	1.228	1.240	1.259	1.258
6.	1.222	1.243	1.278	1.271
7.	1.220	1.240	1.259	1.271
8.	1.230	1.243	1.252	1.271
9.	1.228	1.243	1.270	....
10.	1.228	1.240	1.271	....
Gm. mean	1.225	1.241	1.262	
Mean per cent of H_3BO_3	98.0	99.5	100.9	

The probable error of a single determination was calculated by the formula $r = \pm 0.6745 \sqrt{\frac{\Sigma (v^2)}{n-1}}$. The probable error of the mean of the determinations was calculated by the formula $R = \pm 0.6745 \sqrt{\frac{\Sigma (v^2)}{n(n-1)}}$. v is the deviation from the mean and n the number of observations.

I U. S. P.

$r = \pm 5.4$ mgm. or ± 0.43 per cent
$R = \pm 1.7$ mgm. or ± 0.14 per cent

II Mod. U. S. P.

$r = \pm 2.4$ mgm. or ± 0.19 per cent
$R = \pm 0.77$ mgm. or ± 0.06 per cent

II Trop. O

$r = \pm 7.7$ mgm. or ± 0.6 per cent
$R = \pm 1.6$ mgm. or ± 0.13 per cent

When nitramine was used as an indicator concordant results were obtained only with great difficulty. When the solution of boric acid was saturated with sodium chloride to depress the hydroxyl-ion concentration caused by the hydrolysis of mono-sodium borate, neither with tropeolin O nor with nitramine was the end-point sufficiently sharp for an official method.

DISCUSSION.

The statistical analysis of the raw data shows the modification of the U. S. P. method most satisfactory from the standpoint of accuracy in procedure. Furthermore, this method gives results which are closest to the theoretical. The probable error of a series of determinations is practically negligible.

The values obtained with tropeolin O are somewhat higher than the theoretical. This is what one would expect from theoretical considerations of boric acid and the transition range of the indicator. The indicator begins to change at about the theoretical end-point of the titration. However, the transition range is not sharp and generally an excess of alkali must be added to obtain the reddish brown tint. The transition range of the indicator is between approximately p_H 11 and 13, the reddish brown color appears definitely at about p_H 12. The hydrogen-ion concentration at the true end-point of the titration may be calculated from the following equation:

$$[H^+] = \sqrt{\frac{Kw \times Ka}{c}}$$

in which Kw = 10^{-14} and Ka the dissociation constant of boric acid = 6.6×10^{-10}, and c, the concentration, which is about 0.1 molar:

$$[H^+] = 8.1 \times 10^{-12} \text{ and } p_H = 11.2.$$

Thus it becomes necessary to add sufficient normal alkali solution in excess of the true end-point to change the p_H from approximately 11.2 to 12 in order to reach the midway transition range of the indicator. Supposing the final titration volume to be 50 cc. our problem becomes quite simple. One cc. N sodium hydroxide diluted to 100 cc. is equivalent to 0.01 N solution or 10^{-2} or in terms of $[H^+]$ as the negative exponent of 10, we have 10^{-12} or p_H 12. For 50 cc. approximately 0.5 cc. is required. The theoretical amount of 1 N alkali for 1.25 Gm. of boric acid is 20.2 cc., hence, 0.5/20.2 = 0.0248 or 2.48 per cent excess. By knowing the theoretical quantity of alkali required and matching the color of the indicator at this hydrogen-ion concentration, results in accordance with theory can be obtained. This procedure, in the authors' opinion, is not suitable for an official assay.

In the modification of the U. S. P. assay 1.25 Gm. of boric is employed, dissolved in 25 cc. of distilled water and 25 cc. glycerin. The boric acid is approximately 0.2 molar and the glycerin about 3.5 molar at the end of the titration. After the appearance of the pink color this is discharged by the addition of 25 cc. additional glycerin, increasing the molar concentration of glycerin to approximately 7.

Mellon and Morris (6) studied the potentiometric titration of boric acid in the presence of various polyhydric alcohols. These workers used boric acid in approximately 0.11 molar solution and four moles of glycerin to one mole of acid. The hydrogen-ion concentration of the glycerin-boric acid complex with this proportion of glycerin taken from the curve of these investigators is approximately p_H 4.6. The present authors determined the hydrogen-ion concentration electrometrically of 1.25 Gm. of boric acid dissolved in 25 cc. of distilled water and 25 cc. of glycerin and found it to be 8×10^{-4} or p_H 3.1. When 25 cc. of additional glycerin was added the hydrogen-ion concentration was increased to 1×10^{-3}, p_H 3.0 indicating that the additional glycerin slightly augmented the hydrogen-ion concentration of the complex. After the discharge of the pink color with the addi-

tional amount of glycerin the p_H of the solution was 7.5 indicating that the mixture was well on the acid side of the incipient color change with phenolphthalein. To restore the pink color (p_H 8.3) it requires about 0.25 cc. 1 *N* sodium hydroxide solution, which gives results in accordance with theory. The dissociation constant of the glycerin-boric acid complex calculated from the $[H^+]$ in 0.2 molar solution is $Ka = \frac{(10^{-3})^2}{0.2} = 5 \times 10^{-6}$, which indicates clearly that the complex is a relatively strong acid.

SUMMARY.

1. The titration of boric acid has been studied.
2. The modified Pharmacopœia method herein described is satisfactory for an official method of assay.
3. The P.E. of an individual determination by this method is 0.19 per cent, *i. e.*, the chances are even that one in two determinations will be either mean ± P.E. or that it will differ from the mean by more than one P.E.

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ASSAY FOR ALKALI SALTS OF ORGANIC ACIDS.*

BY JOSEPH L. MAYER.

The United States Pharmacopœia on page 431 directs that alkali salts of organic acids be assayed by the following method:

"Heat about 2 Gm. of the salt, accurately weighed, in a platinum or porcelain crucible, heating at first very gently, then gradually raising the temperature until the salt is thoroughly carbonized. (Caution.—Do not use platinum crucibles for lithium salts.) The final temperature must not exceed a dull red heat and the flame of the burner must not come in contact with the carbonized mass. After allowing the carbonized mass to cool, moisten with distilled water, ignite again and repeat the moistening and igniting until a white residue is obtained. Then disintegrate the ignited mass with the aid of a stout glass rod and transfer the mass and crucible to a beaker. Add 50 cc. of distilled water and titrate with half-normal sulphuric acid, using methyl orange T.S. as indicator. The number of cc. of half-normal sulphuric acid used, multiplied by the proper equivalent of the salt, represents the amount of salt present in the quantity taken."

This procedure has several defects; for example:

If a sufficiently large dish be substituted for the crucible, not only is it easier to obtain a white residue but there is no need to "transfer the mass and crucible to a beaker," the result being that the titration can be done without danger of loss.

Believing that residual titration would give better results than the direct method recommended by the U. S. P., the following experiments were made:

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*Read before the Kings County Pharmaceutical Society, March 8, 1932.

A—Two-gram samples of potassium and sodium tartrate, in very small crystals, were ignited in porcelain evaporating dishes of about 160 cc. capacity and when a white residue was obtained, titrated as directed by the U. S. P. with half-normal sulphuric acid.

The assay indicated the presence of 74.061 per cent of K Na $C_4H_4O_6$.

B—Two-gram samples from the same container were ignited as in *A* and to the cooled residue there was added an excess (35 cc.) of half-normal sulphuric acid and the dish and contents placed on a steam-bath and stirred with a glass rod until all soluble matter was in solution, cooled, two drops methyl orange indicator added and the unacted upon acid determined by titration with half-normal sodium hydroxide.

The assay indicated the presence of 75.712 per cent of K Na $C_4H_4O_6$.

The results by both methods are far apart not withstanding the fact that the duplicates showed remarkably close agreement among themselves.

SUMMARY

1. In the assay of alkali salts of organic acids the U. S. P. should direct that a dish be used in place of a crucible, as it now does for the ashing, as this procedure would not only aid in ashing the material but the titration could be made without transferring.

2. In place of directly titrating the ash as it now does, the U. S. P. should direct that an excess of half-normal sulphuric acid be added to the ash, the dish and contents placed on the steam-bath, stirred until all soluble matter is in solution, cooled, methyl orange added and then titrated with half-normal sodium hydroxide until all unacted upon sulphuric acid is neutralized.

The writer wishes to acknowledge his indebtedness to Berl S. Alstodt for his assistance in making many of the assays.

CONTRIBUTION FROM THE CHEMICAL LABORATORY, BROOKLYN COLLEGE OF PHARMACY, LONG ISLAND UNIVERSITY, BROOKLYN, N. Y.

CHEMICAL STUDIES OF THE FRESH JUICE OF THE MAGUEY PLANT.—(MANSO FINO, KARW).*

A PRELIMINARY REPORT.

BY HERMAN D. JONES.[1]

PAPER NO. I.

The two groups of Agaves, occurring in Mexico, have been previously classified as (1) the amoles, and (2) the magueys. There are three varieties of magueys, pita, mescal and pulque, and of the last named variety the species, Agave Atrovirens,

* From the Department of Biological Chemistry, Alabama Polytechnic Institute, Auburn, Alabama.

[1] The writer is indebted to Don Javier Torres Rivas, of Mexico City, for permission to collect, on his hacienda, the juice used in this investigation, and to Sr. Javier de la Barra for his coöperation during the two years of work in Mexico, while on leave of absence from the Alabama Polytechnic Institute.

Karw, is one of the most important for producing a good quality of sweet sap or aguamiel. Plants of this species, grown at Ometusco in the State of Mexico, furnished the aguamiel used in the studies herein described. This species is known to the natives as *Maguey manso fino.*

For reproduction, the small plants which spring from the roots of older ones are removed to a nursery when about three or four years old. After three to five years' cultivation here, they are moved to their permanent field location and on an average, the plants are twenty to thirty years old before production of sap is completed.

Many investigations have been undertaken to determine the specific therapeutic value of the maguey juice. A summary of a large number of these has been given by Colin (1) and need not be reviewed here. In his investigations Colin isolated a light tan, crystalline compound which he studied for its anti-syphilitic properties and in this he thought he was able to observe some therapeutic value.

For the past three years there have been in progress both chemical and therapeutic investigations of the fresh juice of the *maguey manso fino, Agave Atrovirens,* Karw, and of its effect in experimental nephrities. Some of the chemical results thus far obtained are set forth in this communication. The preliminary results of the other lines of investigation will be submitted for publication at an early date.

ANALYSIS OF FRESH AGUAMIEL.

	N/10 HCl per Gm. aguamiel
Specific gravity	1.0545
Equivalent in degrees Baumé	7.5000
Total acids, as acetic acid	0.1980%
Water	87.3700%
Total solids	12.6300%
Glucose (by Benedict's method)	1.0700%
Invert sugar (by Benedict's method)	11.1200%
Total sugar (by Benedict's method)	12.1900%
Sucrose calculated from glucose and invert sugar	10.7864%
Protein (Nitrogen × 6.25)	0.5680%
Alcohol precipitate	2.8100%
Ether extract	0.0209%
Ash (mineral matter)	0.2470%
Ash (soluble in water)	0.1149%
Ash (insoluble in water)	0.1316%
Alkalinity of ash-soluble	0.07 cc.

MINERALS.

Iron and aluminum as Al_2 and Fe_2O_3	0.0370%
Phosphorus as P_2O_5	0.0450%
Calcium as CaO	0.0028%
Magnesium as MgO	0.00147%
Potassium as K_2O	0.0570%
Silica	0.0240%
Lithium	Traces
Manganese	Traces
Cobalt	Traces
Nickel	Traces
Silver	Traces
Strontium	Traces
Rubidium	Traces
Cesium	Traces
Barium	Traces
Titanium	Traces
Mercury	Traces
Chromium	Traces

(Formic and acetic acids have been found, along with traces of propionic and lactic acids. Lobato gives the name "Agavic" to the acid which he thinks gives to the agumiel its agreeable taste. Boussingault reports the presence of malic acid but up to this time, the writer has been unable to detect its presence.)

Aguamiel from the *maguey, manso fino,* is a saccharine, slightly acid liquid, colorless or translucent when first removed from the plant, this depending on the amount of gum present as an emulsion. It has a sweet, pleasant acid taste and an odor peculiar to the maguey. This gum in the fresh juice is easily precipitated, is viscous and insipid. Its reactions, in general, are similar to the ordinary reactions

of gums. By nitric acid, it is oxidized to mucic acid. When precipitated with alcohol or acetone, it is white and amorphous; on drying, it becomes elastic and finally, when all water has been removed, it can be powdered. It gives some reactions which would lead one to think it gum arabic and, at the same time, will respond to tests for bassorin. It is partially soluble in water, the soluble portion responding to gum arabic tests and the insoluble to bassorin tests. If overheated, it is converted into glucose. Following is an analysis of the fresh aguamiel obtained from a few plants. The magneto-optic method developed by Allison (2) was used in identifying all the minerals, especially those occurring only in traces. Later, spectrographic methods were used in determining these metals and the two methods checked satisfactorily.

In an effort to preserve the aguamiel so that it would not ferment, it was found that this could be done by using 1 cc. of formaldehyde per 6000 cc. of fresh juice for a period of 24 to 36 hours without any change in acidity or any gas formation. It can be preserved also by concentrating to a density of 1.35 to 1.38, equivalent to 38° to 39° Baumé, under 20 lbs. vacuum and 35° to 38° C. If the density falls slightly under 38° Bé., slow fermentation takes place, thereby increasing the acidity of the concentrate. If it is slightly over 39° Bé., the sugar crystallizes, reducing the gravity, and fermentation again sets up. When concentrated under these conditions, the fresh juice remains practically unchanged, only the excess water and a portion of the more volatile acids being removed.

When the formaldehyde is used as a preservative before concentrating the fresh juice, it is completely removed by vacuum distillation process, the fuchsin-sulphate tests being used to test the concentrate for its presence in a large number of samples. The following is an analysis of the fresh syrup concentrated from about ten thousand litres of aguamiel, collected from plants covering a large area. The results, therefore, show variations due to the variations of soil, climate and rainfall.

ANALYSIS OF AGAVE CONCENTRATE, FEBRUARY 6, 1929, BATCH A.

Specific gravity	1.3590%
Equivalent in degrees Baumé	38.3000%
Total acids as acetic acid	0.2400%
Water	29.4700%
Total solids	70.4300%
Glucose (Benedict's method)	9.0560%
Invert sugar (Benedict's method)	50.1760%
Total sugar (Benedict's method)	59.2320%
Sucrose (calc. from gluc. inv. sugar)	48.6707%
Protein (Nitrogen × 6.25)	2.8560%
Alcohol precipitate	5.5700%
Ether extract	0.1900%
Ash mineral matter	2.0400%
Ash soluble in water	1.1250%
Alk. ash sol. Gm. agmel $N/10$ HCl	0.42 cc.

MINERALS.

Iron and aluminum as Al_2O_3 and Fe_2O_3	0.3020%
Phosphorus as P_2O_5	0.6090%
Calcium as CaO	0.0380%
Magnesium as MgO	0.0140%
Potassium as K_2O	0.8240%
SiO	0.0510%
Copper as metallic copper	Traces
Lithium	Traces
Manganese	Traces
Cobalt	Traces
Nickel	Traces
Silver, Mercury	Traces
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Pharm. Acta Helv., 7 (1932), 53

Kroeber, Ludwig
Contribution to the study of medicinal plants of Germany
Pharm. Ztg., 77 (1932), 241

Kühn, K. C.
Cantharides
Pharm. Zentralh., 73 (1932), 97

Laursen, A.
Oxidizing enzyme in gum acacia and its inactivation
Dansk Tids. Farm., 6 (1932), 54

Lipták, Pál, and Szahlendar, Károly
Ipecac root from Rio and Cartagena
Magyar Gyógyszerésztud. Társaság Éretsitője, 7 (1931), 493; through *Chem. Abstr.*, 26 (1932), 1709

ALKALOIDS AND GLUCOSIDES.

Béguin, Ch.
Methyl salicylate glucosides
Pharm. Acta Helv., 7 (1932), 40

Bertrand, Gabriel, and De Berredo Carneiro, P.
Existence and distribution of caffeine and theobromine in the organs of guarana
Compt. rend., 194 (1932), 26; through *Chem. Abstr.*, 26 (1932), 1707

Bridel, M., and Charaux, L.
Water-soluble purgative from black alder bark, hydrolyzable by rhammodiastase
Compt. rend., 192 (1931), 1269; through *Chem. Abstr.*, 26 (1932), 1707

Ehrenstein, Maximilan
Alkaloids of tobacco
Arch. Pharm., 269 (1931), 627

Ekkert, Laszló
Reactions of arecoline
Magyar Gyógyszerésztud. Társaság Értesitője, 8 (1932), 47; through *Chem. Abstr.*, 26 (1932), 1709

Goris, A., and Chalmeta, A.
Critical study of methods for the alkaloidal assay of coca leaves
Bull. sci. pharmacol., 39 (1932), 69

Issekutz, Béla
Potentiometric titration of alkaloids of the papaverine type
Magyar Gyógyszerésztud. Társaság Értesitője, 7 (1931) 488; through *Chem. Abstr.*, 26 (1932), 1708

Kofler, L., and Aufermann, W.
Influence of drying on the saponin content drugs
Heil- u. Gewürz-Pflanzen, 14 (1931), 1; through *Chem. Abstr.*, 26 (1932), 1388

Majima, Riko, and Morio, Shin-Ichi
A new aconite alkaloid
Proc. Imp. Acad. (Tokyo), 7 (1931), 351; through *Chem. Abstr.*, 26 (1932), 1707

Nunn, Arthur W.
Detection of strychnine in cases of poisoning
Pharm. J., 128 (1932), 145

Papavassiliou, Marie
Some new reactions of the salts of quinine and a new method for the quantitative determination of the alkaloid
J. pharm. chim., 15 (1932), 167

Perelmann, J.
Influence of indifferent powders on the alkaloidal assay of dried belladonna extract
Pharm. Zentralh., 73 (1932), 145

Rindl, M.
Alkaloids of the bark of Strychnos henningsii
Trans. Roy. Soc. S. Africa 20, Part 1 (1931), 59; through *Chem. Abstr.*, 26 (1932), 1390

OILS, FATS AND WAXES.

Bourdiol, M.
Viscosities of oils at low temperatures
Bull. sci. pharmacol., 39 (1932), 76

Rothe, Otto, and Surerus, Detlef
Identification of chaulmoogric acid in the oil from Carpotroche brasiliensis
Rev. soc. brasil. chim., 2 (1931), 358; through *Chem. Abstr.*, 26 (1932), 1710

ESSENTIAL OILS.

Bennett, A. H.
Characteristics of Sicilian lemon oil of the current season
Perf. & Ess. Oil Rec., 23 (1932), 39

De Santos, Irene, and West, Augustus P.
Pine needle oil from Pinus insularis of the Philippines
Philippine J. Sci., Vol. 46, No. 1; through *Perf. & Ess. Oil Rec.*, 23 (1932), 36

Penfold, A. R.
Leptospermum citratum oil from New South Wales
Perf. & Ess. Oil Rec., 23 (1932), 35

Will, Hanns
Estimation of essential oils in drugs
Apoth.-Ztg., 47 (1932), 216

Winkler, L. W.
Contribution to the investigation of essential oils
Pharm. Zentralh., 73 (1932), 98

Wührer, J.
Triorthocresyl phosphate in apiol
Apoth.-Ztg., 47 (1932), 232

Zimmermann, Walther
Use of the vanillin-hydrochloric acid color reaction in the examination of essential oils
Pharm. Zentralh., 73 (1932), 113

ANALYTICAL METHODS AND RESULTS.

Berg, Richard, *et al.*
New method for the determination and separation of salicylic acid, saligenin and salicylaldehyde
Chem.-Ztg., 55 (1931), 975; through *Chem. Abstr.*, 26 (1932), 1387

Busi, M., and Collina, C.
Analysis of ethylene for anesthetic use
Atti soc. ital. progresso sci., 19 (1931), 195; through *Chem. Abstr.*, 26 (1932), 1707

Chelsi, Santiago A.
Studies in the Vitali reaction for atropine II
Anales farm. bioquím., 2 (1931), 26; through *Chem. Abstr.*, 26 (1932), 1710

Csipke, Zoltán
Test for citric acid in galenical preparations
Magyar Gyógyszerésztud. Társaság Értesitője, 8 (1932), 56; through *Chem. Abstr.*, 26 (1932), 1710

Ekkert, Laszló
Reactions of anesthesine
Magyar Gyógyszerésztud. Társaság Értesitője, 8 (1932), 45; through *Chem. Abstr.*, 26 (1932), 1709

Hart, Merrill C., and Emerson, Harold
Quantitative determination of α-dihydroergosterol in ergosterol from ergot
J. Am. Chem. Soc., 54 (1932), 1077

Mikó, Gyula
Titrimetric and new gravimetric determination of theobromine sodium salicylate
Magyar Gyógyszerésztud. Társaság Értesitője, 8 (1932), 34; through *Chem. Abstr.*, 26 (1932), 1709

Mikó, Gyula
Color reaction of aloes with metric acid
Magyar Gyógyszerésztud. Társaság Értesitője, 7 (1931), 499; through *Chem. Abstr.*, 26 (1932), 1709

Mikó, Gyula
Determination of caffeine, pyramidon and phenacetin in the presence of each other
Magyar Gyógyszerésztud. Társaság Értesitője, 8 (1932), 30; through *Chem. Abstr.*, 26 (1932), 1709

Rosenthaler, L.
Brom-acidimetric procedures III
Pharm. Acta Helv., 7 (1932), 45

Rupp, E., and Poggendorf, A.
Preparation of sodium cobaltic nitrite reagent
Apoth.-Ztg., 47 (1932), 282

Schorn, Edwin J., and McCrone, Robert M.
Determination of mercuric oxide and mercuric ammonium chloride
Pharm. J., 128 (1932), 187

Ubrig, E.
Practical testing of ampul glass
Pharm. Ztg., 77 (1932), 227

ORGANIC COMPOUNDS.

Dumont, P., and Declerck, A.
Contribution to a study of abasine, allonal, bromural, codeonal, dial, cibalgine, didial, dialacetine, hemypmon, diogenal and declonal, etc.
J. pharm. Belg., 14 (1932), 158, 177

Eisenbrand, J.
Light absorption of certain arsenic compounds of the arsphenamine group
Arch. Pharm., 269 (1931), 683

Hart, Merrill C., and Emerson, Harol
β-Ergosterol
J. Am. Chem. Soc., 54 (1932), 1070

Heyl, Frederick W.
Sterols of ergot III
J. Am. Chem. Soc., 54 (1932), 1074

Niederl, J. B., and Matelson, Samuel
Synthesis of thymol, chlorothymol and homologues of thymol
J. Am. Chem. Soc., 54 (1932), 1063

Wagenaar, M.
Microchemical reactions of vanillin and piperonal
Pharm. Weekbl., 69 (1932), 190

CLINICAL METHODS AND TESTS.

Patton, H. W.
Simple colorimetric method for the determination of potassium iodide in blood and urine
U. S. Naval Medical Bull., 30 (1932), 214

Schoorl, N.
Sugar titration with De Jong's reagent
Pharm. Weekbl., 69 (1932), 253

PHYTOCHEMICAL LITERATURE.*

BY EDWARD KREMERS.

With the classification of all natural objects as belonging to one of the three natural kingdoms, mineral, vegetable and animal by Emanuel Koenig in 1682, it became the practice of authors of chemical texts to arrange the *materia chemica* in like manner. A text of far-reaching influence is Lemery's *Cours de Chimie* which first appeared in 1675 and which served as a standard text in many countries for a century and a half. The division on Plant Chemistry in this treatise resembles a text on vegetable materia medica during the second half of the 19th century, rather than a text on phytochemistry. But very few chemical individuals are enumerated by Lemery. Even Berzelius *Lehrbuch*, as late as 1837, still suggests this resemblance though, by that time, many chemical individuals had been isolated from plants and receive due consideration in the text. Still later, in Liebig's *Handbuch der Chemie* of 1843 a goodly share of the section devoted to "Organic Chemistry" is replete with phytochemical material.

With the second half of the 19th century the tendency toward synthetic compounds gained the ascendency. Witness Berthelot's *Chimie organique fondée sur la synthese* of 1860. After that Kekulé's structural theories prepared the way for a veritable orgy of synthetic organic chemistry. During the fourth quarter of the 19th century, organic chemistry began to share its primacy with physical chemistry and since the beginning of the 20th century, not only inorganic chemists, but organic chemists as well, have been trained largely in physico-chemical methods and have applied the new viewpoint to their researches.

If the chemical developments of the past half century have revealed a strong tendency away from the study of the products of plant life, the latest development has drifted, nevertheless, into an application of both synthetic organic chemistry and physical chemistry to the study of life problems. Thus Emil Fischer is quoted as having stated that "The great and stimulating problems of organic chemistry have their roots in their application to biology." His ambition, it has been said, was to synthesize a sugar, an alkaloid and a protein. He accomplished this and much more for phytochemistry though he seldom worked with plants as such. If Emil Fischer has done much for what may be regarded as phytochemical statics, so-called biochemists of to-day are utilizing their physico-chemical training in the study of phytochemical as well as zoöchemical kinetics. Both points of attack of the chemistry of plants are equally important. One danger in the latter point of view lies in the fact that its methods are not infrequently based on an insufficient knowledge of the chemical individuals involved in the investigation, hence, the interpretation of results may go astray. The present biochemical situation is comparable in a measure to the one existing in

* Section on Historical Pharmacy, A. PH. A., Miami meeting, 1931.

agricultural chemistry a generation ago when the nitrogen content of fodders was interpreted in terms of protein.

From what has been said it will be seen that no hard and fast line can be drawn, on the one hand, between general chemical literature and phytochemical literature; also, on the other hand, between phytochemical literature and biochemical literature. As will be shown later, it is equally impossible to draw a sharp line between general treatises on phytochemistry and somewhat specialized treatises. Thus treatises on the chemical analysis, socalled of plants, do not belong in the same class with such special treatises as those on carbohydrates, oils, alkaloids, etc. (Going a step farther neither can treatises on microchemistry be grouped with those special classes of phytochemical literature.) The compiler of this literature will, therefore, be guided largely by the titles of the books under consideration as reflecting the author's point of view. Hence, only those books are to receive consideration at this time the titles of which specifically class them as phytochemistry.

Omitting Uslar's[1] (1795), de Saussure's[2] (1804) and Nees von Esenbeck's[3] treatises, which are phytophysiological rather than phytochemical in character, the book literature comprises the following titles arranged chronologically. For editions, translations and comments on the several treatises, see under authors' names.

1821. Runge, *Neuste phytochemische Entdeckungen zur Begruendung einer wissenschaftlichen Phytochemie.*
1834. C. Koch, *De phytochemia.*
1847. Fr. Rochleder, *Beitraege zur Phytochemie.*
1854. Fr. Rochleder, *Phytochemie.*
1858. Fr. Rochleder, *Chemie und Physiologie der Pflanzen.*
1871. Husemann, Hilger und Husemann, *Die Pflanzenstoffe.*
1882. E. Ebermayer, *Physiologische Chemie der Pflanzen.*
1905. Fr. Czapek, *Biochemie der Pflanzen.*
1908. H. Euler, *Grundlagen und Ergebnisse der Pflanzenchemie.*
1911. C. Wehmer, *Die Pflanzenstoffe.*
1913. Haas and Hill, *An Introduction to the Chemistry of Plant Products.*
1913. H. Snyder, *The Chemistry of Plant and Animal Life* (2nd ed.).
1920. M. W. Onslow, *Practical Plant Biochemistry.*
1920. R. W. Thatcher, *The Chemistry of Plant Life.*
1924. Georg Trier, *Chemie der Pflanzenstoffe.*

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[1] An English translation "with additions by G. Schmeisser," was published in Edinburgh in 1795, under the title *Chemicophysiological observations on plants.*

[2] *Les recherches dont je m'occupe dans cet Ouvrage, ont pour objét l'influence de l'eau, de l'air et du terreau, sur la végétation.* Though the method is chemical rather than that of plant mechanics and plant physics, the point of view is that of the agricultural plant physiologist. The *Recherches chimiques sur la végétation,* par Théod. de Saussure, Paris, 1804, were translated by F. S. Voigt as *Theodor von Saussure's chemische Untersuchungen ueber die Vegetation (mit einem Anhange und Zusaetzen versehen)* and have been made generally available by A. Wieler, as Nos. 15 and 16 of Ostwald's *Klassiker der Exakten Wissenschaften.* Leipzig. Verlag von Wm. Engelmann, 1890.

[3] *Die Entwicklung der Pflanzensubstanz....* Von C. G. Nees von Esenbeck, C. G. Bischof und H. A. Rothe. Erlangen, 1819. According to H. C. Bolton's *Select Chemical Bibliography* (*Smithsonian Miscellaneous Collections* No. 850, Wash. 1893), page 695, the complete title reads.... *physiologisch, chemisch und mathematisch dargestellt mit combinatorischen Tafeln der moeglichen Pflanzenstoffe, und den Gesetzen ihrer stoechiometrischen Zusammensetzung.*

The treatises that appeared during the nineteenth century may be regarded as possessing historical interest only. The collected papers of phytochemical investigators can scarcely be regarded as general treatises. For essays and addresses of a general nature such as Ciamician, *"The photochemistry of the future"* see Phytochemistry (Addresses, etc.).

Though in a certain sense not general treatises, yet more out of place under the caption Special Literature, are the treatises on phytochemical analysis. These also are arranged chronologically. For special information the reader is referred to the author's name.

1795. Hermbstaedt, *Anleitung zur chemischen Zergliederung der Vegetabilien.*
1808. ————, *Chemische Tabellen der Pflanzenanalysen.*
1858. Fr. Rochleder, *Anleitung zur Analyse von Pflanzen und Pflanzentheilen.*
1868. Wittstein, *Anleitung zur chemischen Analyse von Pflanzen und Pflanzentheilen.*
1869. Arata, *Guja parael Analysis immediato de dos Vejetales.*
1880. Parson, *A Method of Proximate Analysis of Plants.*
1882. G. Dragendorff, *Die qualitative und quantitative Analyse von Pflanzen und Pflanzentheilen.*
1923. L. Rosenthaler, *Grundzuege der chemischen Pflanzenuntersuchung.* Zweite Auflage.

As may be assumed from the dates, all of these treatises but the last are out of date. In addition to Rosenthaler, the recent special literature will have to be consulted. In this connection, however, mention should possibly be made of two treatises on the microchemical examination of plants, *viz.:*

1913. O. Tunmann, *Pflanzenmikrochemie.*
1913. H. Molisch, *Mikrochemie der Pflanze.*

Attention should also be directed to recent book literature that covers biochemistry rather than phyto- or zoöchemistry. Of the *Monographs on Biochemistry* edited by Plimmer and Hopkins, only one, *The Development and Present Position of Biological Chemistry* by F. G. Hopkins, is of general interest; (see monographs), the others will be included in the special bibliographies. Abderhalden's *Handbuch der biochemischen Arbeitsmethoden* (1910), also his *Biochemisches Handlexikon* (1911), the former in 8 parts (10 vols.), the latter in 9 parts (10 vols.), both compiled with the aid of specialists, have become the modern handbooks of the physiological and organic chemist as well as the phytochemist.

Finally, there should be mentioned Ritsema and Sack's *Index phytochemicus* published in 1905, which, however, was not continued and which has since been replaced by Wehmer, the phytochemist's "Beilstein." Quite different, but of sufficient importance to be mentioned in this connection is *Price List 44 (6th Edition)* of *United States public documents relating to plant life* for sale by the Superintendent of Documents, Washington, D. C., U. S. A. (February 1914), a pamphlet of 63 pages. Last, but not least, mention should be made of the *Acta Phytochemica*, a Japanese periodical devoted exclusively to plant chemical research. (Vol. I, No. I appeared in 1922) and to *Plant Chemistry* ephemeral monographs published by The Ievata Institute of Plant Biochemistry. (No. I, Tokyo, 1924.)

* * *

Runge, F. F.—Friedlieb Ferdinand Runge was born Feb. 8, 1795 near Hamburg as son of pastor J. G. Runge. Originally pharmacist, he turned first to

medicine (M.D., Jena, 1819: *De nova methodo . . . .*), and then to chemistry (Ph.D., Berlin, 1822: *Diss. de pigmento . . . .*). His pharmaceutical-phytochemical foundation found expression in both dissertations, also in his *Neuste phytochemische Entdeckungen zur Begruendung einer wissenschftlichen Phytochemie*, published in the interval, *viz.*, 1820–1821. Shortly after his second graduation he lectured at Berlin on Phyto- and Zoöchemistry.

After his "Wanderjahre" in Germany, Holland, France, England and Switzerland, he was appointed Professor of Technology at the University of Breslau. At the beginning of the thirties he was appointed director of a chemical factory in Oranienburg on the Havel. Pensioned in 1854, he died March 25, 1867 in strained circumstances. However, before his death the London Industrial Exposition of 1862 honored him with a medal for his researches on coal tar published in 1834 in which he had made discoveries of the most fundamental importance. However, these had not been exploited by his own factory because of the beaurocratic stupidity of its officers. Because of his factory connections, most of his later contributions to science were of a technological character.

His phytochemical dissertations and book publications are:

De nova methodo veneficium belladonnae, daturae, nec non hyosciami explorandi. Jenae, 1819.

Neuste phytochemische Entdeckungen zur Begruendung einer wissenschaftlichen Phytochemie, 2 Haefte 8°, Berlin, 1820–1821.

Diss. de pigmento indico ejusque connubiis cum metallorum nonnullorum oxidis. Berlin, 1822.

Of his phytochemical journal articles the following may be listed:

Ueber d. Bestandtheile d. Krapps u. ueber Krappfaerberei. Erdmann's Journ. I^{V}, 1829.

Ueber d. Atropin. Schweigg. Journ., Vol. 43 (1825).

Chemisch-technische Monographie des Krapps oder vergleichende Untersuchungen der Krappfarbstoffe und der verschiedenen Krappsorten. Berlin, 1845.

Runge's fondness for pigments, more particularly dyestuffs, found expression in his *Grundriss der Chemie* which was published in 1846. Each and every one of the inorganic substances described is represented, so far as its color is concerned, by a square of colored paper which accompanies the description in the text. The American student may be interested to know that Wm. Simon adopted this practice in his *Manual of Chemistry with Plates.*

A biography, written by Anschuetz, may be found in Hoefer, *Allgemeine Deutsche Biographie.* A list of his publications, supplemented by Anschuetz, can be consulted in Poggendorff, *Biogr.-litter. Handwoerterbuch.*

Other biographical material of interest:

Von dem Entdecker der Anilinfarben. Pharm. Ztg., 1885, No. 23.

Friedrich Ferdinand Runge. Ein Gedenkblatt zu seinem, 61. Todestage. N. Y. *Apoth.-Ztg.*, 1928, pages 35 and 49; from *Heimat und Welt.*

As to the erection of a monument over Runge's grave by the *Deutsche chemische Gesellschaft,* see *Berichte,* 2 (1869), page 325; also 5 (1872), pages 839 and 1119.

* * *

Runge, F.—Neueste Phytochemische Entdeckungen zur Begruendung einerwissenschaftlichen Phytochemie.

While published in book form, this was, after all, an attempt on part of the author to establish an ephemeral, quasi journal or "phytochemische Lieferungen" (see page X) of which the first appeared in 1820 and the second in 1821. Enthused with the idea to change phytochemistry from a name to a science, the author conceived daring plans which did not materialize (page VIII). From the purely scientific aspect he was soon switched over to the practical (see Biography). So far as we know, his Phytochemical Society never got beyond the stage of good intentions; and his elaborate scheme of classification of the science did not outlive the printed suggestion. Even his suggestions as to a rational nomenclature of the *materia phytochemica* failed because they were based on a strict analogy of organic chemistry to the inorganic chemistry of acids, bases and salts, an analogy that was hailed as a great achievement on part of the theoretical chemist after Sertuerner's discovery of 1817, but which failed even in the modified form given to it by Liebig.

Viewing the publication as an ephemeris, its table of contents will readily tell its story. For the sake of bibliographic completeness, its main title—not commonly used—should be given, namely, *Materialien zur Phytologie.* The first "Lieferung" also bears the subtitle: *Anleitung zur einer besseren Zerlegungsweise der Vegetabilien durch Theorie und Versuche erlaeutert von.....*

Inasmuch as the books have become very rare, the table of contents, arranged in chapters, may here be given:

Erste Lieferung, 1820

1. *Phytochemische Prinzipien.*
2. *Reagentien.*
3. *Zerlegungsweise der Pflanzen.*
4. *Critische Bemerkungen ueber die jetzt herschende Namenmacherey in der Phytochemie.*
5. *Versuch einer Zerlegung der drey sogenannten Narkotica: Hyoscyamus niger, Atropa Belladonna, und Datura Stramonium.*
6. *Kaffe.*
7. *China.*
8. *A. Crocus sativus, Safran.*
   B. Aloe.
9. *Der narkotische Stoff der Bilse, der Belladonna und der Datura im Conflikt mit dem lebenden pflaenzlichen und thierischen Organismus.*
10. *Quantitative Bestimmungen ohne direkte Anwendung von Mass, Wage und Gewicht.*
11. *Ueber die Extraktbereitung aus Narkoticis.*

Zweite Lieferung, 1821

1. *Die Phytologie und das Verhaeltniss der Botanik und der Phytologie zu ihr.*
2. *Die Metamorphose der Pflanzen.*
3. *Die Pflanzenstoffwelt.*
4. *Zur Zerlegungsweise der Pflanzen.*
5. *Reagentien.*

Anhang. Ueber Extraktivstoff und die Darstellung der Pflanzenbasen und Pflanzensaeuren.

Thus far no book reviews have been found in the pharmaceutical journals of the early twenties of the nineteenth century, *viz.*, in the *Almanach*, the *Archiv* and the *Berlinisches Jahrbuch.* Hence, we are not advised as to the reception of the *Materialien zur Phytologie* by the contemporaries of their author and editor.

* * *

Karl Heinrich Emil Koch, born on the Ettersberg near Weimar, June 6, 1809, died in Berlin, May 25, 1879, as Extraordinary Professor of Botany. As a student of medicine he inclined to botany. Having attained the doctor's degree in Medicine in 1833 in Wuerzburg, he acquired the degree of Doctor of Philosophy in Jena in 1834, offering as dissertation[1] his *De phytochemia*. Here he became "Privatdocent" in Botany. He explored Asia Minor. His publications were almost exclusively botanical, with decided leanings towards dendrology.

Allg. Deutsche Biographie 16, page 395, based on "Biogr. Skizze Karl Koch's, den Freunden gewidmet von Frau Koch." Poggendorff, *Biogr. Lit. Handwoerterbuch*, Bd. III, page 732.

* * *

Koch, K. H. E.—De phytochemia. Dissertatio inauguralis . . . . pro venia legendi.

This inaugural lecture, delivered before the Philosophical Faculty of the University of Jena, April 28, 1834, is dedicated to Professor J. W. Doebereiner who, in 1810, had been appointed Professor of Chemistry, Pharmacy and Technology, the appointment having been brought about by none less than Goethe, the advisor of the Archduke of Sachse-Weimar. (Hugo Doebling, *Die Chemie in Jena zur Goethezeit*, Jena, 1928, however, does not mention Koch.) The author signs himself as "Dr. Phil. Med. Chir. et Art. Obst."

The lecture, in Latin, has little interest other than historical. It is devoted in large part to an historical account of the author's knowledge of organic substances obtained from plants. Its special significance, if any, lies in the apparent fact that he was influenced by Runge and the latter's attempt to make phytochemistry a science; also in his recognition of Sertuerner's discovery of the alkaloids from which event he dates a new period in phytochemistry.

The lecture concludes with a brief account of the preparation of "Caryophyllatinum" and "Sylvaticinum," and an elementary analysis of the former.

(*To be continued*)

[1] E. Wimschumann, in his biography in the *Allg. Deutsche Biogr.*, states that Koch received his degree of Doctor of Philosophy on the strength of this dissertation, whereas the title page specifically states the publication is a dissertatio inauguralis. . . . pro venia legendi. Possibly it may have served both purposes.

"No one appreciates the value of a highly qualified pharmacist more than does the doctor. A great share of the physician's success is due to the care and precision with which his prescriptions are filled. A highly trained, properly qualified pharmacist is more careful of his stock and prescriptions than one not so qualified. The more highly trained the pharmacists are, the better is the service the physicians can give, since the utmost in pharmaceutical service is needed to make the utmost in medical service possible. The physician can encourage the qualified pharmacist by patronizing him and can in this way help the laudable effort of the pharmaceutical profession to advance its educational and practical standards."

"Medicine and pharmacy are specialized fields of professional service within the larger and inclusive field of health work. Their separation began at a time in the development of civilization so long ago that it cannot be stated in chronological terms, but it must have begun at a time when what we now call medical and pharmaceutical knowledge had accumulated to a point where one person could no longer encompass and utilize it all, and the separation completed itself gradually."—ARTHUR W. ERSKINE, M.D.

BELLADONNA MONOGRAPHS.*

BY FREDERICK B. KILMER.

The monograph, which may be considered as a written form for the presentation of a single subject, or a special class of subjects, is found among the products of ancient civilization, and comes down to the present time.

Monographs are found baked in clay, engraved on stone and written on parchment, dating back many centuries. Some of the Hebrew writings, such as those found in the Scriptures, may be classed as monographs.

Before the advent of the art of printing, monographs were often issued in duplicate by copyists. Specimens of some of these still remain in libraries. They constitute some of our most interesting and valuable possessions. There are collectors in this country and abroad who have specialized in the collection of monographs, and their libraries are unique and priceless. With the advent of printing, some of the older manuscript monographs were put in type, printed and circulated.

The renaissance of learning and the printing press gave to an author an opportunity to "get himself into print" by issuing an edition of his monograph for circulation among his colleagues.

Of interest to the student of history is the correspondence between the author and his contemporaries after the issuance of a monograph devoted to theology, philosophy or science. In this sort of correspondence, the whole subject is at times reviewed and discussed at length, often contributing materially to the theme of the monograph.

Scientific journalism and scientific societies were originated in the Seventeenth Century. Thus was produced a new method for the dissemination of scientific information, giving an impetus to progress in matters of science.

The earlier of the scientific journals were restricted as to size, and the space which could be given to any one subject was limited. Hence, monographs were continued as separate publications after the advent of the journals. The Eighteenth and Nineteenth Centuries produced many monographs.

The pamphlet form of publication, which might be considered as belonging to the same category as the monographs, has been a favorite form in politics, religion and science, and still persists.

Among the drug monographs issued prior to 1800, there were three devoted primarily to Belladonna.

The ordinary student would give these scraps of paper only a passing glance. Copies which have survived through the centuries are eagerly sought after by book collectors and librarians. As specimens of the early printer's art, they are of interest. They are printed from hand-set type, one page at a time, upon linen paper, with carbon inks. Quite in contrast to present-day issues printed on chemicalized pulp, these old prints will remain intact for centuries to come, while modern prints will tend to disappear.

They are of value to the research worker, placing before him, as they do, a review of the knowledge of the subject at the time of their issue, recording the progress of scientific thought. These leaves, yellowed and hallowed by centuries of time, stand as a clue to a living existence. From each page comes "a voice that

* Section on Historical Pharmacy, A. PH. A., Miami meeting, 1931.

speaks as though the heart of its creator still throbbed—thoughts of the past take shape and live in this atmosphere." (Lloyd.)

Taken separately or together, they contain information in regard to the drug Belladonna and the narcotic *Solanums* which is not only interesting, but valuable to the student of drugs.

To obtain the full story of the drug, one must search these monographs. They embrace the full knowledge of the drug existing at the time they were written. Within their pages will be found statements unknown to earlier writers upon the same theme. Incidentally, in their pages will be found records of facts later propounded as discoveries.

FABER'S "STRYCHNOMANIA."

Standing first in order of time, and by far the most complete among the monographs upon Belladonna, is the work which was produced by Johannes Matthaeus Faber, a Würtemburg physician.

Faber's father was a Reformed Church clergyman in Augsburg. After a preliminary education, following the German custom, young Faber strolled through the lecture halls of six universities, finally receiving a Doctor's Degree at Strassburg (1653).

For a time he was physician to the Imperial City of Esslingen. He afterward rose to the rank of physician-in-chief of the household of Duke Frederick of Würtemburg. In 1670, he became physician to the City of Heilbronn, which position he held until his death (1702).

The ducal residence was in the small village of Neustadt, near Heilbronn. It was during his practice in this village that the incident which inspired the research that in the end produced his notable monograph "Strychnomania" occurred.

While serving his princely master, Faber investigated the mineral waters of the section. Some of the springs had been known to the Romans, but had been abandoned. The results of his labors were published in 1669 under the title "A description of the for many years well known, now through Divine Providence re-discovered, wild or healing spring at Reigham."

The Prince, in emulation of the great rulers, was surrounded at his "Court" by painters, sculptors, men of science and literature. Among these savants was the French refugee, Dr. Charles Patin, son of Guy Patin, who was a scholar, anatomist, botanist and pneumatist.

This association with the Royal household greatly influenced Faber in his life work. He added to the Duke's collection specimens of Roman remains, the beginnings of an herbarium, and some of his own drawings. He used the library of the Prince in his research upon Belladonna, and inserted in the monograph his "nuncupatory epistle to Dr. Carlos Patin."

Faber's century witnessed the bitter contentions of the Galenites and the Paracelsusites in medicine. Faber followed Galen rather than the "ignorant boaster," Paracelsus. Influenced in his dissentions by the French school, he ignored Harvey's discoveries as to the circulation of the blood.

We may look upon Faber as are presentative of the othodox medical school of his day. He believed in the doctrine of signatures and of astrological medicine. He was, however, bold, independent and progressive and his methods of treatment were rational and in accord with the faculties of medicine of his age.

Faber's chief claim to historical fame lies in his monograph "Strychnomania." Suddenly confronted with fourteen cases of poisoning through the eating of Belladonna berries, he began a systematic study of the plant, and after ten years of labor produced a volume of one hundred and twenty-eight pages in Latin text, with twelve etchings on copper. (Printed in 1677.)

The "Strychnomanicum" of the ancients had, in Faber's time, come to be *Solanum furiosum*. The book is "a record of its history and inherent quality. The frequency, the swiftness and the severity of its death-dealing power, the occurrence of a notable slaughter through its use, the antidotes and the healing powers of the plant, have all been written as a caution and as a security against a recurrence of a calamity and for the public good."

The book is dedicated to his Princely patron.

In a histrionic procemium the Scriptures are cited, using the Hebrew text, to show that the "amentia," blindness, stupor, aphonia, drunkenness poured out upon the children of Israel for their transgressions of the law are quite comparable to the evil effects of the *Solanum furiosum*, "the apple of the furies," to which his book is devoted.

The "occult qualities" of the Solanum arise in the celestial channels of divinity—the stars. The baneful actions are induced by certain stars. "From the influence of planet or comet, we certainly experienced the saddest thing that ever happened to our citizens, when, in the Autumn of 1667, that fatal apple, Solanum, was distributed by the agency of several of our citizens."

Led on through this "disaster," Faber arranged to examine more carefully the nature of such an evil. In this study he "gradually discovered such unusual, rare and great things, that we believed them to be not only for our own information, but for the instruction of others;" hence, the book "Strychnomania."

Approaching dramatic literature, quite in contrast with the ordinary dry recitals of "case records," are Faber's "observations." Withal, they are penned by the hand of a master at clinical observation.

A "stupid teamster" had gathered branches of the Solanum bearing the tempting berries and had distributed them through the village.

And then! like a black cloud, the dread plague of stupor, blindness and delirium leading to death, settles upon the hamlet. Fourteen persons, five adults and nine children, within a few hours, are stricken with the furious poison.

With the acumen of an epidemiologist, Faber not only attends to the sick and dying, but seeks out the cause of the unknown, alarming disaster that is rapidly spreading through the valley. It is found to be the berries of the heretofore little known *Solanum furiosum* (Belladonna) distributed by the teamster.

Nothing escapes Faber. He traces the berries from the bush in the field to their transportation to the homes of the victims, follows their ingestion and notes their effects minute by minute. He records changes which precede dissolution, and, with artistic skill refers to the passing of the "vital spirit," and "the return of the soul to its Maker." In the fatal cases he relates the post-mortem phenomena.

The clinical observations (probably for the first time) note the variability of the action of the drug in respect to age and temperament.

The situation was novel, startling, perplexing. Faber was confronted with a serious situation, to him of unknown extent. He was without guiding precedent or authority, with no accurate knowledge of the cause. He was surrounded by an excited, superstitious, ignorant peasantry, prone to hide rather than to reveal.

In a few hours sickness had come to widely separated households. Home remedies had been administered, and the summoning of medical assistance delayed. When morning came to the village, some of the stricken were already cold in death. The cause and the extent of the dread visitation were unknown. New victims were continually coming to view. It might be that it was covering the whole Dukedom, or the whole land. They asked: "Was it the judgment of Heaven, or the work of the evil one?" The religious resorted to fasting and prayer; the wise, including Faber, studied the signs of the Zodiac.

As each new victim appeared, consternation, dread, fear and forebodings swept over the people of the hamlet. The effect upon the inhabitants was so great that

for many years thereafter, according to Faber's records, when the death of a child occurred suddenly rumors of a new epidemic of poisoning spread through the village.

In the midst of this consternation and terror, Faber, groping in the dark, without the aid of consultant colleagues, far away from medical supplies, by slow stages unravelled the thread and saved twelve out of fourteen cases—a creditable showing. The skill and acumen which he exhibited gave him a place among the medical heroes that went before, and came after, his time.

Faber lived only in the dawn of scientific plant classification, and before the word "pharmacognosy" had been coined.

He made an attempt to gather the Solanums into a group. Faber's classification is based upon affinity of structure, "internal and external," but in a larger part upon physiological and medicinal action. He also notes the habits of growth and general appearance of the plants as a whole. He enumerates twenty-seven species of Solanums allied to Belladonna; twelve of these are illustrated with drawings on copper, made for his book under his guidance. To relieve the dullness of a botanical dissertation, he injects quotations from Horace and Homer. He was familiar with the properties of the Mandragora, but makes no allusion to the superstitions of the laity in regard to this plant.

As the book is primarily devoted to Belladonna, Faber's description of the plant is very full. His list of names and synonyms for Belladonna stands as the first on record. If we add the Linnæus designation of *Atropa belladonna*, it will be practically complete.

Faber's knowledge of Belladonna came from a study of the living plant. In his description, we go with him into the fields at the edge of the Harthueser Wood, where we see the purple-flowered bush growing abundantly, with its deadly berries glistening in the sun. He notes its growth, from sprout to seed; he examines its stalk, root, leaf, flower and fruit, describing every part as his eyes see it. He feels, smells, tastes—and notes the results. He follows the life history through the seasonal round—Spring, Summer, Fall and Winter. The effect of the weather upon the plant is recorded. He quaintly applies the time-honored philosophy as to the influence of the planets upon vegetative life. The stars rule their growth, give them their form, and instil into them their deadly and their beneficent powers. His Solanum is under the "dominion of Saturn, the companion of Mars."

Faber's work might well be commended to students of pharmacognosy. He possessed none of the modern aids for plant study. With his eyes and his mind he reads the plant's intimate structure and function. He knew nothing of colloids, nor of protoplasm; he had no knowledge of photosynthesis or alkaloidal bases; yet he crudely and quaintly foresees much that we know to-day.

Following the doctrines of humoral pathology, Faber places the Solanums under Saturn and Uranium, "both inducing dryness, and, in fact, the heat of one modifies the frigidity of the other."

This influence of the planets determines the "temperament" or power of the Solanums to produce "extreme dryness," manifested in the symptoms of constriction, "tears restrained, sleep abolished," etc. The temperament of the planets is heat and dryness (modified); hence, a "dry poison."—"The tongue dries, the lips

dry, the bowels are torpid." Constriction, strangulation and other symptoms following the ingestion are due to "dryness."

To us it seems fantastic and irrational, even ludicrous, but in Faber's time it was a rational and a sound philosophy, hallowed through the ages, taught, believed and followed by the savants. While we do not accept it, we may look upon it with interest and with respect.

According to Faber, the action of *Solanum furiosum* is to be explained, not so much by properties which are visible and obvious, as by powers which are so obscure as to escape observation, or which at least are not generally known. Solanum action is, however, explainable by methodical investigation and rational inference.

Prior to Faber, and for some time after, it was not universally conceded or known that Belladonna acted as a poison.

That all plants which are fully under the dominion of Saturn are poisonous, or, in other words, that all poisons are Saturnian, was one of the striking tenets of astrology. The idea that the plants of Saturn draw sustenance and poisonous juices from the planets seems a unity of nature doctrine with a twist.

According to Faber, poisons "attack first, insidiously—slow poisoning; second, violently; third, in an unusual manner; fourth, damage the principal functions; fifth, attack immediately; sixth, their action is aided by adjuvants." Which division is not so far removed from a Twentieth Century classification.

In ancient medical practice, substances classed as poisons were not ordinarily used as remedial agents. Faber's theme is that the poisonous action of certain substances may be corrected by "medical art," and thus become beneficial.

With Faber, we are still striving to unravel the action of poisonous substances, toxins, etc.

Prior to Faber, Belladonna and the Solanums had been "hated, repudiated, degraded." At the risk of being stamped as unorthodox and perhaps "irregular," Faber dares to speak of their "benign powers."

When authorities disagree, Faber undertakes to decide. Fearlessly, he cites all discordant opinions.

The poetic conception of the universe, as Faber saw it, has disappeared. The bees have not lost their sting, but they no longer distil the nectar of the flowers into venom. Chemistry would not allow this.

The heavens of the astrologer, with its entrancing mythology, has been wiped away by the astronomer. We no longer trace in celestial space the source of a plant's noxious power.

According to Faber, *Solanum furiosum*, born of the dread Saturn, father of Pluto, devourer of children, who, though dull, heavy, grave and lethargic, was susceptible of becoming intemperate and rampant!

Solanum, "the companion of Mars," changed in form on every emergence from conjunction with the sun!

Solanum, comrade of Mercury, with implements of destruction!

Solanum, whose flowers carry the benediction of Paradise, also bears flaming rays of energy. The varying phases of the placid Luna governed Solanum's maddening virus.

A pleasant fancy! All true when written, but now effaced under the scalpel of science.

Perhaps there will arise some painter who, while not restoring this picture, will portray one of more grandeur out of our concept of life, staging the interplay and grouping of the physiochemical elements and energies building up plant life.

Since Faber's time, we have come to know that the action of the different species of narcotic and mydriatic Solanums is greatly varied. While in some instances their alkaloidal contents are somewhat alike, their place and purpose are both physiologically and therapeutically different.

Faber intimates that the Solanums produced in one country differ from those of another clime. To an extent, such a notion still prevails.

Solanum furiosum—Belladonna—according to Faber, belongs to a class of "minor" poisons, the injury of which may be "curable." Over and over, he maintains that the poisonous action of Belladonna depends upon the "imprudent exhibition" in the dosage, the quantity, the conditions. He anticipated the more exact knowledge that came two centuries later as to the physiological action of the drug. Long after Faber, this action was brought forward as a new discovery.

With a limited, or perhaps a total lack of, knowledge of the nervous system, he indicates the drug's action thereon. Nevertheless, he pointed out the action of the drug through the, to him, occult, mysterious method. Of curious interest is his statement that the poison can be destroyed by "boiling."

We wonder whether Faber foresaw our knowledge of the adsorption of alkaloids in his idea that the poison was neutralized by the contents of a full stomach? He heretically noted the primordial, elective and indirect action of the drug, and its modification by other drugs.

Faber plunges into the mystic depths to explain the action of the Solanums on the human system. The Lunar rays, the sinister Saturnian and Jovial rays, act upon the plant, governing the parts of the body affected, and account for the symptoms appearing in the drug's action.

The nature of the action of the plant on humankind can be read in its structure: The bell-shaped pendent flowers point to the influence upon the head; the diuretic power is due to the number of berries. The berries of the Belladonna "express the darkening and glowing pupil," so marked in the manifestation of its power. The anatomical structure of the eyes, its nerves and muscles, are revealed in the calyx of the plant. The filamentous roots of certain species of Solanum simulate crabs, thus resembling the constellation "Cancer," and indicating the disease and the cure.

Long after Faber, the narcotic Solanums were "discovered" and exploited as a cure for cancer.

For the first time in the history of the plant, its physiological action is recorded in systemic form. One by one, each action is minutely described and, from his view, accounted for.

Faber's disclosures of the symptoms which he sees would parallel to a degree with the symptoms following Belladonna poisoning in our present textbooks, and do him credit as a painstaking pioneer author. In viewing his interpretation of the cause of the phenomena, we must view it from his age. Such a thing as an active principle or an alkaloid had not been dreamed of. Hence, his comparison of the resemblance of the Belladonna berries to grapes, and of their juice to wine, suggesting that the delirious intoxication simulating drunkenness may be due to some sort of concentrated malignant wine spirit in the juice of the berry.

The anodyne, hypnotic, narcotic action and seemingly opposite hysterical manifestation are influenced by the position of the planets which govern the plant, as they move through the Zodiacal constellation of Sagittarius, or the Archer.

Faber noted that the Solanum has a "peculiar malignity toward the eyes." But when it comes to that which in our day is a highly important action of the drug —mydriasis—he sees "a cloudy vision," "obfuscation," "opaque, smoky lens," but the enlarged pupil apparently had no meaning to him.

The mydriatic action of Belladonna and other Solanums was known long before Faber, and the knowledge was lost; it was repeatedly re-discovered before Faber, and repeatedly lost. Faber, like others before him and after him, missed what to us is a most characteristic action of Belladonna—the dilatation of the pupil of the eye.

We may ask whether, in our haste, we have laid aside or missed any important property or action of our drugs. Centuries hence, will we have buried and forgotten such an important thing as the mydriatic action of Belladonna?

In one of the chapters, the diseased anatomy in cases of Belladonna poisoning, including postmortem signs, is considered. In Faber's time, the notion that the bodies of persons dead of poison rapidly decomposed was considered scientific. He heartfully relieves the intricate and gruesome discussion by quotations from the classic poets.

In a dramatic word picture, Faber depicts the struggle of the body with a drug "endowed with malignity," created peculiarly for the destruction of the human body.

For ten years Faber searches the authorities, and lays down the principles of treatment as applicable to Belladonna poisoning. He presents nothing new.

Had we before us a panorama of the methods of treatment followed in cases of poisoning by the narcotic Solanums, from the time of Alexander (200 B.C.) down to our present era, our view would reveal the fact that through the millenniums, and at the end, the methods remain the same—prompt measures, emetics, evacuants, antidotes, purgatives, emollients, heat. Our present-day authorities have added measures to meet accompanying symptoms and secondary effects. They have evolved better methods of applying treatment, but in principle the measures remain the same.

For every phase and symptom of poisoning, a remedy is given, its action and the rationale of its use noted. Among these are the famous "theriaca," the renticular stone, the sigillatous earths. These are commended only as adjuncts to other forms of treatment.

Under the term "Specifics" he commends wine, cites cock dung and other ancient remedies, and in the end arrives at vinegar, "a remedy blamed by no man, praised by the principal writers, and found in our observation unique and immediate in action." Vinegar still appears in our textbooks as an antidotal measure in narcotic poisoning.

An exchange of letters between George Jerome Welsch, S.P.D., and Faber, forms an appendix to the work. In most courteous and diplomatic language, the writers discuss the relationships of the various species of the Solanums botanically, as well as their physiological and therapeutic action. Not unlike modern botanical controversies, the disputants flounder among the confusing nomenclature, and fail to reach a conclusion.

Faber closes the discussion with the expression: "At length, the end of this writing must be imposed. Farewell, and, as thou art accustomed, listen kindly."

In this modest volume we catch glimpses of medical history in the "glorious Seventeenth Century."

Johannes Matthaeus Faber, an ordinary practitioner of medicine, orthodox in his tenets, living and serving in a small community, physician and counsellor to the august Frederic. As physician to his city, he was health commissioner, inspector of pharmacies and advisor to its citizens and neighbor to its inhabitants. In modern terms, Faber was a "humanist." His humanism was in part derived from his classical training and the collaboration of the polite branches of knowledge. He ennobled the practice of physic through his inherent piety, good humor and good sense. He ever held a high regard and sympathy for his patients, believing himself responsible for their welfare. In this service he died poor, and his resting place is unknown and unmarked.

Through his acknowledged skill in the sciences, Faber was made a member of the Academy of Vienna. While holding to the traditions of his art, his mind was philosophic and speculative. He was bold enough to revolt against existing opinions.

Faber's labors were in no sense epoch-making. From our present-day vista he adds nothing to our knowledge of the subject. Turning backward, however, we find that he opened the door to the later studies of Belladonna and allied drugs which, in the centuries that followed, became of great importance.

We may join with Francus, his professor and colleague, in his poetic tribute: "Behold! Faber is the Faber (artificer) of the fortunes of men and health." And again, with his fellow worker, Welsch, we may exclaim: "Delight of Medicine, ornament of letters and pearl of Necker, most glorious and excellent man!"

SICKELS' "DISSERTATION CONCERNING BELLADONNA."

In 1724, or nearly fifty years after Faber, there was issued a second monograph on Belladonna written by Christopher Conrad Sicelius (Sickels) under the title "Botanico-Medical Dissertation Concerning Belladonna or Solanum Furiosum."

It forms a pamphlet of sixty pages, with a single illustration—that of the Belladonna plant. The pamphlet is an interesting specimen of the printer's art of the period, showing curiously wrought ornaments, chapter and page headings and initial letters. The printer was Henrique Christopher Croker, of Jena, a name well known among book collectors. Not many copies of the book remain. The title does appear in many bibliographies of the drug.

But little is known of the author. He attained the degree of Doctor of Medicine at Jena, and at the time of the issuance of the monograph he was a practitioner of medicine in the Prussian province of Nordhaus. His fame as a writer appears to rest upon this one effort.

The work is inscribed and dedicated to four professors of the University of Jena with effusive laudations. In doing this, he glorifies his University and exalts himself.

In accordance with the custom of the time, the dissertation carries a laudatory poem by the author's pastor, Frederic Christian Lesser.

The urge which inspired the dissertation is not clear. In part, there seems to have been the desire to place the author's erudition before his colleagues to "get

himself into print." There may have been a hope that in some way this effort might inspire a call for him to serve his University.

Sickels' botany is taken from Chabræus and other writers. Botanical classification, in Sickels' day, had arrived at a stage where leaf, flower and fruit were taken into account.

He enumerates fourteen plants as belonging to the Solanum group, among them being the *Stramoniums* and the *Mandrakes*, but the *Henbanes* are omitted. He states that the Belladonna, as evidenced by several characteristics, belongs to this group, but that in many respects it differs therefrom. At times he classifies the Belladonna as a "false Solanum."

His description of the plant is taken from books, and lacks the keenness of Faber's observations made upon Belladonna as it grew in the fields. He stresses the resemblance of Belladonna root to Chicory. He takes a fling at the apothecaries and herbalists, who, he claims, mix the Belladonna with harmless roots.

Sickels' mind was undoubtedly tinged with poison phobia. But his statement that "Our most praised medicaments may become poisons" was conceded in later centuries. Without intention or knowledge, he clearly forecasts the later discoveries of bacterial toxins.

His classification of the powers and effects of the narcotic Solanums are contradictory and confusing. The Stramoniums and the Mandrakes are poisonous; the Henbanes are rarely poisonous; Belladonna is always poisonous in its effect.

The gist of Sickels' dissertation and the only original observation in it is built around a quaint "shotgun" prescription characteristic of the period. This prescription was a mixture of roots and herbs to be made into an infusion for the alleviation of a cough. Its administration was followed by unexpected manifestations. The symptoms indicated narcotic poisoning. The results were not fatal. Among the ingredients called for in the prescription was Chicory root. Upon investigation, it was found that Belladonna root had, by accident, been mixed with the Chicory and dispensed in the mixture. This incident gives Sickels an opportunity to continually scold the apothecaries and to warn medical men against them.

The peculiar poisonous power of Belladonna, from Sickels' point of view, was due to "that certain sulphur" placed therein through the influence of the stars. This was not the crude sulphur of the shops, but the refined, ethereal essence of sulphur, one of the four spiritual elements from which all things were made.

Sickels' theory as to the reasons for the action of Belladonna is largely his own formulation. Possibly his desire to promulgate this theory impelled him to issue his monograph.

Upon a hasty reading, the ideas seem absurd. "Perfect rot" was the comment of one of the translators. Let us go back two centuries and sit beside Sickels, under the dim, flickering lamp of his day and age, seeing Belladonna and its action as he saw it. He casts aside the superstitions as to evil spirits entering into the plant. He dismisses the doctrine of signatures as the source of its noxious and malignant power. Its virulence is not due to conjunction of the planets. Sickels finds that the poisonous power of Belladonna arises from one of the four elements of the ancients—"vaporous sulphur"—symbolized by the lion and fire. When Belladonna is injected into the stomach, vaporous sulphur is free, reacting upon the

"spirits," the nerves, the flesh and blood of the victim who has taken the poison. This explains the phenomenon.

Let us now step forward two centuries into the Twentieth. Science has changed the four elements of the ancients into many simpler bodies. In plants, certain complex basic substances possessing physiological action have been found. Among these bodies, still somewhat illusive and obscure, are certain ones called alkaloids. In Belladonna, the aklaloids named Atropine, Hyoscyamine, etc., have been found. These so-called alkaloids from Belladonna, in the Twentieth Century, produce the phenomena cited by Sickels in the Eighteenth Century.

Let us go back two hundred years, substitute the word "alkaloid" for Sickels' "vaporous sulphur" and re-read the chapters. Then the whole aspect is changed.

If we again move forward two hundred years, we will find that Sickels' "reasons" for the action of Belladonna fit in quite well with those of modern authority. In noting the powers and effects of Belladonna, Sickels, of course, did not have the knowledge revealed in the later researches into the pharmacology and physiological action of the drug. He notably fails to record the mydriatic action of Belladonna. Sickels' measures for the treatment of cases of poisoning by Belladonna are those cited by the "fathers of medicine." They contain nothing new. These measures, in many respects, are those still in use. As in Sickels' time, we have no specific antidote for the poisonous element in Belladonna.

Taken altogether, Sickels finds no place in medicine for Belladonna. He finds that other anodynes are more reliable and safer than Belladonna. He is not a modernist. "Therefore, we ought to be less solicitous to-day to discover new medicaments, choosing from the better and safer ones already known."

Sickels, with modesty, estimates the value of his dissertation when he states: "However paltry are the things which these pages contain, they are not, indeed, altogether worthless, nor will the scattered observations be without some utility to practitioners." Sickels' "Botanico-Medical Dissertation Concerning Belladonna" is of interest to the student of drugs.

(To be continued)

THE PHARMACIST'S SHOW GLOBES.*

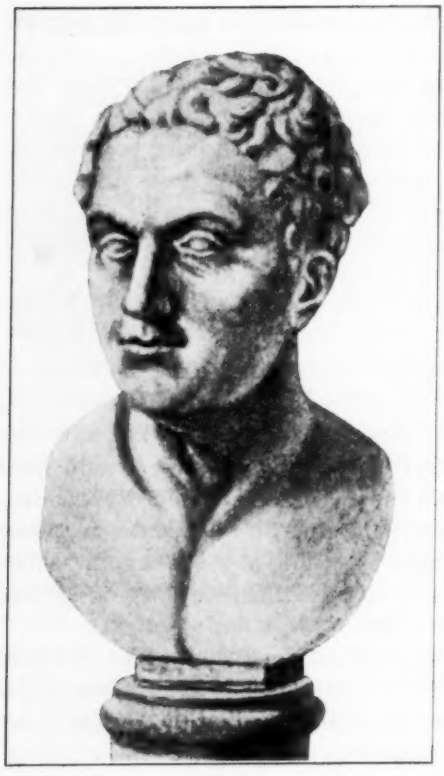
BY AARON LICHTIN.[1]

History is one of the greatest heritages of the civilized races. A correct knowledge of one's national history and a proper retrospect of a country's ethical, cultural, economic, military, social and political problems is at the very foundation of true patriotism. Just as the horizon is widened and patriotism strengthened by a knowledge of national history, so does the knowledge of the past problems, struggles, defeats and victories of a profession such as ours—pharmacy—enhance professional pride and facilitate further progress.

What a wonderful panorama is unfolded by our profession's past. For some forty centuries it has been slowly and steadily stepping forward in the march of

* Section on Historical Pharmacy, A. PH. A., Miami meeting, 1931.

[1] The author of the paper illustrated his subject with many lantern slides—the article was presented by Prof. Louis Gershenfeld; only a few of the Globes are shown.



GALEN.

progress. Early in its history pharmacy was closely allied with medicine; in fact the same individual practiced both arts. LaWall tells us in his "Four Thousand Years of Pharmacy" that in the thirteenth century of the common era pharmacies, as such, where medicines were sold began to spread rapidly. Maimonides, the celebrated Jewish physician, in a letter, written in September 1199 says (1), "Then I attend to my patients, write prescriptions and directions for their various ailments." It is to be presumed that these prescriptions had to be filled by someone qualified in the practice of pharmacy.

The appearance of the drug store required some sign or mark to distinguish it from other stores. The necessity of a token of distinction makes the pharmacist's show globes a subject of considerable importance in pharmaceutical history. To appreciate the need of a distinguishing designation you must picture a shopping street of that period and the state of education of the shoppers. The streets—most of them—were narrow and winding, no street lighting was available. At night a lantern was carried, illuminated by a candle or natural oil. The people who could read and write were few in number, consequently places of business were designated by some sort of a token, more often than by a painted or printed sign; thus, we find the Inn of Adam and Eve, a hostelry in London, in 1750 distinguished by a sign of the two Biblical characters; the Lion Pharmacy in Odense, Denmark, established, in 1549, was designated by the sign of a lion; these marks served to help the shoppers recognize their goal.

Pharmacists, as a class, adopted as a sign the heads of Galen (second century A. D.) and Paracelsus (1439–1541).

"It was certainly from a noble spirit of doing honour to a superior desert, that our forefathers used to hang out the heads of those who were particularly eminent in their profession. Hence, we see Galen and Paracelsus exalted before the shops of chemists" (2).

PARACELSUS.

Another distinguishing mark for the pharmacy and one which may still be seen in some localities is the mortar and pestle.

"One of the signs originally used exclusively by apothecaries was the mortar and pestle, their well-known implements for pounding drugs. Among the celebrities who sold medicines under this emblem was the noted John Moore, author of the celebrated worm powder, to whom Alexander Pope addressed these lines:

"How much, egregious Moore, are we deceived by shows and forms;
Whate'er we think, whate'er we see, all human forms are worms."

"His shop was in St. Lawrence Poultney Lane. Every week the newspapers contained advertisements proving, by the most wonderful cures, the efficacy of his powders."

Show vases of early nineties.

Grecian vases, double pineapple style of 1886.

A drug store sign exhibited at a signboard exposition held in London, in 1762, bore the picture of three gallipots—A gallipot is a glazed earthenware jar, covered with parchment paper, used for storing solid extracts, ointments, etc. Among the early American signboards for a drug store was a picture of a carboy; such a sign hung at 73 Westminster Street, Providence, R. I., from 1843 to 1850 and later at 31 Westminster Street in the same city (3).

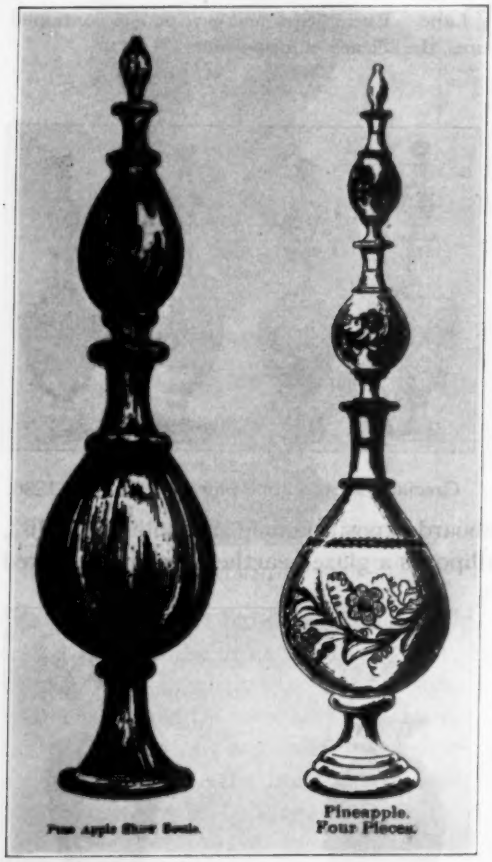
Show bottles of early nineties.

The beginning of the use of show globes as a distinguishing mark for a pharmacy cannot be definitely ascertained. The difficulty to find any information on these globes is best illustrated by a quotation from a letter from the Smithsonian Institution.

"We recently had occasion to make quite an extensive search for historical references pertaining to show globes. The search failed to disclose any authentic information on the subject. In fact none of the older and best known medical and pharmaceutical histories which we reviewed contained any information concerning these globes."

However, there are several conjectures which have been noted in regard to the origin of these globes which are worth relating. One is told by W. W. Figgis in JOUR. A. PH. A., 8 (1919) 422:

"When Julius Caesar invaded Ireland, a boat was sent ashore from the offing to locate the most advantageous landing place. A spot was selected on a shelving shore directly opposite a certain apothecary's shop, in the windows of which were certain large bottles containing drugs, which were in process of maceration, and the contents showed different colored liquids. On a promise of immunity as a reward, the arrangement was made that this apothecary would place lanterns behind these bottles to guide the landing of troops, which was made that night. The undertaking was successful, and to commemorate the same, an edict was issued by Julius Caesar that thereafter all apothecaries would be honored by being allowed to use colored carboys to identify their establishments."



Three-piece pineapple show globe of 1874; four-piece of early eighties.

Another conjecture is that the colored show bottles had their origin about the time of the great plague in London, in 1655, a time when people were compelled to reach the pharmacies without any loss of time. The colored light displayed served to guide the hurried messenger. No authentic information, however, was found to support any of these accounts.

LaWall states the origin of the colored show bottles to be as follows:

"Maceration had been employed for many centuries. Sometimes the directions for maceration required the operation to be conducted in the light for a certain number of days, and the large containers of tinctures in the process of manufacture, often two or three gallons in size, which usually stood in the pharmacist's front window evolved in later years into the show bottles of colored liquid which characterized the drug store of the latter part of the nineteenth century."

The sight of the show globes in a pharmacist's window is credited with inspiring a Scotch youngster, James MacKenzie, to the study of medicine. He later became a celebrated cardiologist, and was knighted and appointed consulting physician to the King of Scotland. Sir James MacKenzie, as he is better known, born in 1853, was apprenticed as a youth, to a pharmacist with whom he remained till the age of 21 and then studied medicine in Edinburgh, although he maintained an active interest in pharmacy throughout his life. He died in 1925. Judging from his biography the druggist's show globes were in use about the middle of the nineteenth century (4).

The show globes are considered by the Pennsylvania pharmacy law as well as by the pharmacy law of other states as the recognized symbol of a pharmacy and regards the use of them by any other place of business as a violation; to quote from an official communication, Section 15, Act 163, reads as follows:

> It shall be unlawful for any person, firm or corporation to use the title: "pharmacist," "assistant pharmacist," "druggist" or "apothecary" except as authorized under this act... or in any manner by advertisement, circular, poster, sign, symbol, insignia... refer to the place of business as a drug store, pharmacy, etc., unless the place of business is a drug store or pharmacy, duly licensed by the Board of Pharmacy.

"The board believes that it is rather well established that the show globes are an insignia of a pharmacy and regards the use of them by any other place of business as a violation of this section of the pharmacy law."

No matter how much one may delve into the origin and history of these beautiful colored objects, no real conception can be had of their appearance unless they are actually seen. A number of slides were prepared illustrating a number of various styles which have been used at various times. In collecting the material for these slides the writer was greatly helped by Joseph W. England, the Whitall Tatum Co. and L. S. Williams, a retail druggist from Baltimore who possesses the largest and most beautiful collection of these beautiful objects in glass in the country, fifty-one globes, to be exact.

The show globe is of the deepest significance to us worshipers at the shrine of Æsculapius. It identifies us at once as practitioners of an ancient and honorable profession; it gives us a legal right to a symbol which may not be used by any other class of business, but a right which may be lost through lack of exercise. The show globe should be restored to its former dignity.

REFERENCES.

(1) "Maimonides," Yellin and Abrahams, 1903.
(2) "History of Signboards," Hotten, 1860.
(3) "*Bulletin of the R. I. Historical Society*," Vol. XIX, No. 2 (April 1926).
(4) *Chemist and Druggist*, 107 (1927), 259.

1545 South Seventh St., Philadelphia, Pa.

COST OF THE HOSPITAL PHARMACY.

We quote the following from the advertising message, of a large, well and favorably known manufacturer, in *Hospital Topics and Buyer*, for April, under the caption of "Stinting the Pharmacy."

"The average total cost of a pharmacy, including salaries, represents only about three per cent of total maintenance cost.

"Few hospital executives sanction the building of additions which do not reflect the latest ideas in design, layout and beauty. Few would not specify the best in apparatus and equipment; yet executives frequently turn to the drug department, so vital to the institution, as the place to begin paring down operating costs to meet deficits."

Edward W. Runyon, member of the American Pharmaceutical Association, since 1875, left New York on April 9th for a six months' trip to South America and Europe. His South American itinerary includes stopovers at Lima, Santiago, Buenos Aires, Rio de Janeiro and Beahi. From South America he will cross to Europe. Mr. Runyon has made these journeys for a number of consecutive years and, at his age, is quite an undertaking, but he enjoys travel and, especially, meeting his friends.

Editor Hugo Kantrowitz of the *Apotheke Zeitung* states that the rates for the European trip, which he has in charge, have been very much reduced.

DEPARTMENT OF BUSINESS MANAGEMENT

Conducted by Paul C. Olsen.*

COMMENTS, QUESTIONS AND SUGGESTIONS ARE INVITED AND WELCOME.

Readers are invited to submit comments, criticisms and suggestions regarding the material which appears in this department. The Editor will also undertake to answer questions regarding general problems of business management. Letters of general interest will be published, but the writer's name will not be revealed without his permission.

ADVERTISING AND SELLING PROBLEMS OF DRUG STORES.

DIRECT ADVERTISING.

BY PAUL C. OLSEN.

Direct advertising includes a variety of media. When advertisements are sent by mail by a drug store, they may be in the form of letters, postal cards, booklets, folders and even magazines or newspapers published in the interest of the store.

The same forms of direct advertising can be distributed from house to house, or they can be handed to customers when they come in the store. Another form of direct advertising frequently used by drug stores is through samples, novelties, literature, booklets, blotters, etc. A pharmacy cannot afford to use literature that misinforms, or samples that bring the establishment into a class beneath that desired by the owner.

As is the case with newspaper advertising, the advantages and limitations of which were described in the preceding article in this series, effective direct advertising is prompt in the results it produces. Wrap, for instance, a sample tube of cold cream with each purchase by a woman customer. If the product is a meritorious and appealing one, and none other should be used, the pharmacist soon begins to receive calls for larger quantities of the cold cream. Similarly, a letter is sent to physicians in the neighborhood of the store saying that it now has on hand an ampul that has been given publicity in medical publications. Almost immediately, orders begin to be received by the druggist for this ampul.

A second advantage of direct advertising is its flexibility. Much is written and said, for instance, about the waste of sampling. When samples are passed over the counter of a pharmacy it is not a very difficult matter to confine their distribution to the customers who appear to be most likely to make purchases of the product being sampled. It is much easier to do this than is the case, for instance, when coupons from newspaper and other periodical advertisements are presented at the store to be exchanged for samples.

The flexibility of direct advertising permits special advertisements to be sent to different kinds of customers. Physicians receive one kind, dentists another, and veterinarians and nurses still other forms. When direct advertising is used, special advertisements can be written and their distribution confined to mothers

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with young babies, for example. It might be well to follow up advertisements for foods and other items in medical journals.

Because direct advertising is flexible, it is possible not only to confine the distribution of particular advertisements to the persons most likely to be interested in them, but also to insure their arrival in the hands of these persons at the most appropriate times. If a druggist, for instance, is attempting to interest the barbers of his community in the purchase of some of their supplies from him, he would not call nor send direct advertisements to reach them on a Saturday, the day on which barbers customarily do more business than any other three days of the week.

In efforts to obtain the interest and good-will of physicians, for example, it should be remembered that direct advertisements reaching them on Mondays and Saturdays have to face a much greater competition for attention than is the case with direct advertisements received during the middle of the week. Therefore, it follows that greater returns per dollar expended in direct advertising by retail druggists may be achieved if the advertising is received at a time when the recipient is likely to be able to give the most attention to it.

A great deal is written about the waste involved in direct advertising. There is no use denying that waste does exist in direct advertising. I wrote a letter one time for a publisher of a pharmaceutical reference book. This letter was sent to the proprietors of 50,000 individual drug stores in the United States. Of these 50,000 drug store proprietors, 49,000, or 98 per cent, apparently cast the letter aside without even reading it or, perhaps, without even opening it. The 1000, or 2 per cent, who did read and act upon the letter, however, ordered enough books to make the total expenditure on the entire 50,000 letters produce very satisfactory profits.

That's the thing to remember about direct advertising. It's not the 98 per cent or 90 per cent who don't respond that should be considered but rather it is the sales and profits produced by those who do answer. If these returns are enough to make the entire cost of the advertising profitable, what does it matter about those who don't respond?

Critics of direct advertising are fond of calling attention, as I have in the foregoing, to the fact that most direct advertising goes straight to the waste basket, oftentimes without even a passing glance. Naturally, every user of direct advertising wants to increase the return he gets from it. The fact that only a 2 per cent or 5 per cent return is received from direct advertising, should not deter anybody from using it, if the 2 or 5 per cent return is sufficient to produce a profit from the money expended.

I get a little out of patience sometimes with all this talk about the waste-basketing of direct advertising. Some of it comes from proponents of other advertising media who should know better. One might think to hear this talk that while direct advertising follows a straight route to the waste basket, all newspapers are carefully filed and perennially perused.

It is true that people do keep magazines longer than they do newspapers and, consequently, magazine advertisements have a longer life than newspaper advertisements. Coupon returns from magazine advertisements prove, however, that the great bulk of the response is received, in the case of monthly magazines within thirty

days from the publication of the advertisement, and in the case of weekly magazines, within seven days from the publication of the advertisement.

Every form of advertising has its advantages and its limitations. No one is best for all purposes. The wise advertiser recognizes the peculiar advantages and limitations of each form and chooses for the advertising of a particular project the form or forms of advertising which are best adapted to that special situation.

The profitable distribution of samples as a form of direct advertising rests upon the well-known principle that the product itself is its best advertisement. National advertisers spend millions of dollars each year to produce in magazines realistic reproductions of their product, recognizing that while the product itself is its best advertisement, a realistic reproduction of it is the next best substitute. The ancient Chinese proverb is correct, "One picture is worth ten thousand words." Carrying this Oriental wisdom a little further, it is plainly to be seen that the product itself, as a means of advertising, is worth far more than any picture of it, possibly more than 10,000 pictures of it.

There are, of course, dangers and pitfalls to be avoided if sampling is to be a profitable means of direct advertising. White women want wavy hair and colored people, both men and women, want straight hair. Madame Walker needed to know no more than this plain fact to build her widespread, successful business. La Gerardine wave set appeals to an entirely different group.

Samples of medicines should not be distributed indiscriminately. On the other hand it will be recognized that samples of medicines placed in the hands of physicians and other professional people may lead to a profitable series of prescriptions for these preparations. Drug stores advertising by samples should control the distribution of them by distributing them exclusively over the counters of their stores or as a part of personal visits to physicians and other professional people. In many cities, local ordinances prohibit the indiscriminate distribution of medicinal samples from house to house or by mail.

Novelties are used by drug stores as a means of direct advertising because of the long life these novelties may have. For instance, a message to mothers of young children about the importance of diphtheria inoculations for their children may be printed on a postal card, letter or in a newspaper advertisement. In most cases, the message receives a glance, if that, after which it is discarded. If, however, the same message is printed on a blotter, the blotter is not likely to be discarded as quickly because the blotter is obviously a useful article. It may remain on someone's desk or writing table for quite a while, and thus greatly increase the likelihood of the message on it being read and acted upon. What is true of blotters is true of other means, if properly selected.

There is danger, though, in having too much hope about the length of the effective life an advertisement attached to a novelty is going to have. A druggist, for instance, may spend a dollar each on very elaborate calendars and justify his expenditure in the belief that the calendar advertisement will be seen and read for an entire year. The truth is, though, familiar things soon lose their novelty and gradually are forgotten, even if they are in plain sight and in use every day. Most of the people who have hung this expensive calendar in their offices or kitchens won't be able a few days after it is received to say from memory whose calendar it is.

If you don't believe this, try to remember, without looking it up, who supplied your kitchen calendar this year.

It should be remembered, too, that novelties chosen for direct advertising of a drug store should be appropriate and in keeping with the character of the business. If they are otherwise, they may attract attention, but the attention wont't be favorable and the reaction thus produced upon customers and prospective customers will be decidedly negative. For example, there are many women, and men, too, who are violently opposed to the use of tobacco. There could thus be a needless risk of antagonizing a group of important customers. What applies to cigarettes may also apply to other items, pictures, reading matter, etc.; in other words the selection of advertising requires careful consideration and study.

ACETYLSALICYLIC ACID AND ITS SOLUTION IN POTASSIUM CITRATE SOLUTION.

BY A. H. CLARK.

Frequently we have seen published statements or heard discussions regarding the solubility of aspirin in potassium citrate and similar salts. For some time it was thought that such a solution was an ideal way to dispense acetylsalicylic acid. Leech[1] has shown very clearly that acetylsalicylic acid in such a solution hydrolyzes rapidly and that after about four days fifty per cent is broken down. Snidow and Langenhan[2] have reviewed the literature of this decomposition quite completely as well as the hydrolysis of the acid by water alone. All the evidence presented in connection with the hydrolysis of acetylsalicylic acid by water, either with or without alkaline citrate, is very easy of confirmation. All that one needs to do is to carefully titrate a given volume of a newly prepared solution with standard alkali, half normal preferred, using phenolphthalein as indicator. From time to time titrate the same volume in the same way and note the increased volume of alkali required. When this volume has doubled complete hydrolysis is indicated. Leech plotted a curve, volume of alkali used against time of standing, which is very interesting and a similar experiment is plotted below.

After listening to numerous discussions of this subject by pharmacists and physicians, I became much impressed with the insistence of many that such solutions were therapeutically effective for some time after preparation. Even though, as Leech points out, fifty per cent of the acid is decomposed at the end of four days, the decomposition is progressive and for this four-day period such a solution might be very effective. Several "favorite prescriptions" of doctors have been mentioned in the writer's presence in which acetylsalicylic acid is dissolved in potassium citrate solution and sugar or syrup and flavoring added. The often repeated statement that such solutions retained their therapeutic activity excited the writer's interest to such an extent that experiments were started to determine whether or not something had remained undiscovered in connection with this question.

It was surprising to note that some of the prescriptions containing flavored syrups did not show the rapid rate of hydrolysis that Leech found in his aqueous

[1] *Jour. A. M. A.*, 78 (1922), 275.

[2] "A Pharmaceutical Study of Acetylsalicylic Acid," JOUR. A. PH. A., 14 (1925), 694.

mixture. This led to the very natural conclusion that sugar might decrease the rate of hydrolysis of acetylsalicylic acid in such solutions. Several solutions were made and the rate of hydrolysis noted. It was found that with increasing amounts of sugar the rate of hydrolysis decreased. For example, a solution which contained about 300 Gm. sugar in 500 cc. and 2.5 times as much potassium citrate as aspirin, was hydrolyzed to the extent of 41 per cent at the end of five days and remained thus for thirty days. Another solution, saturated with sugar, otherwise the same as above was 19.3 per cent hydrolyzed at the end of the second day. The maximum amount of hydrolysis, 34.5 per cent, was reached between the fifth and sixth day and at the end of thirty days no further hydrolysis had taken place. The graph below shows typical curves of a solution without sugar and two solutions with different amounts of sugar.

Glycerin also seems to inhibit the hydrolysis of solutions of acetylsalicylic acid in potassium citrate. Since glycerin dissolves potassium citrate freely there is no

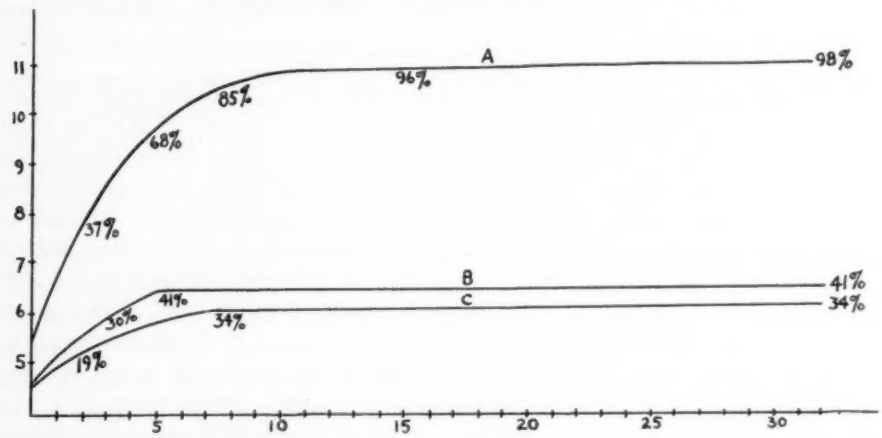

Fig. 1.—A, shows the curve for aqueous solution, no sugar or glycerin. B, curve for a solution containing 600 Gm. sugar per liter. C, curve for a solution saturated with sugar (about 850 Gm. per liter).

Vertical divisions represent cc. $N/2$ KOH used to titrate. Horizontal divisions represent the age of the solution in days. Percentage figures show approximate decomposition on the days titrated.

difficulty in preparing such solutions with glycerin. One solution of the acid in glycerin saturated with potassium citrate showed very little hydrolysis in a month's time. This solution was very viscous and hard to handle. It would hardly be practical to make or use such a solution on this account unless it would be for use as a stock solution for the preparation of small amounts of solutions of acetylsalicylic acid to be used over a short period of time.

Solutions containing less glycerin seemed to behave much like the sugar solutions although a very thorough examination of these was not carried out.

The solutions examined were made by dissolving the potassium citrate in water, using about fifteen times as much water as acetylsalicylic acid, and about three times as much potassium citrate as acid. The acid was then added to this solution and shaken rapidly until dissolved. The sugar (or glycerin) was then added and the mixture made up to a definite volume with water and shaken

frequently until the sugar was dissolved. If the solution of sugar and potassium citrate is first made and the acid added to this, solution takes place very slowly, from one to three days being required, depending upon the density of the sugar solution. During this time appreciable hydrolysis of the acid takes place. If glycerin is saturated with potassium citrate the solution is very viscous and several days are required for solution of the acid although, in this mixture, hydrolysis of the acid is not great during the process of solution.

Two very interesting problems were brought forcefully to mind during this work. The first one is that of the relative quantities of the acid, the potassium citrate, and water most advantageous to use in making such solutions. Very little was done in this connection but it was shown by one series of experiments that in a one part aspirin, three parts potassium citrate, ten parts water mixture, more aspirin dissolved than in a 1, 1, 10 or 1, 2, 10 or 1, 4, 10 or 1, 5, 10 proportion. By doubling the proportion of water, solution was very promptly completed in the 1, 3, 20 combination, while the others were but little affected by the increased amount of water.

The second and most interesting question is—What is the nature of the combination, if any, of acetylsalicylic acid and potassium citrate that makes the acid more soluble? This latter question is still open for study.

SUMMARY.

The experiments described show that in a solution of acetylsalicylic acid in potassium citrate the hydrolysis of the acid, which is complete in about two weeks, can be reduced to about thirty per cent in four to six days by the addition of sugar and that thereafter no further hydrolysis takes place within thirty days. This is assuming that the rate of hydrolysis of the acid is accurately shown by the increase in acidity.

It is also evident that an acetylsalicylic acid-glycerin-potassium citrate solution behaves in much the same manner.

The best proportions of acid, potassium citrate and water seem to be about one of acid, three of potassium citrate and fifteen to twenty of water. Such a solution saturated with sugar seems to undergo the least change.

UNIVERSITY OF ILLINOIS COLLEGE OF PHARMACY, CHICAGO, ILLINOIS.

CANADIAN MEETINGS.

The AMERICAN PHARMACEUTICAL ASSOCIATION met in Toronto, September 4, 1877; William Saunders, of London, Ontario, was elected president. The second meeting in Canada was held at Montreal, August 12, 1896, and Joseph E. Morrison was elected president of the ASSOCIATION. Since the meetings mentioned the Canadian Pharmaceutical Association has been organized, so that the convention in Toronto in August will be a joint meeting with our sister organization, to which many A. PH. A. members are looking forward with happy anticipations. This will be the 25th anniversary of the Canadian Pharmaceutical Association and the 80th annual meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION; the Ontario Retail Druggists will also be in session, thus the convention will be international, and it is hoped the Associations of a number of countries other than those named will be represented by delegates.

Sir Henry S. Wellcome, Honorary President of the AMERICAN PHARMACEUTICAL ASSOCIATION, has been elected fellow of the Royal College of Surgeons. This is the second time that a person, not holding a medical degree aside from members of the Royal Family, has been thus honored; the other recipient was Field Marshall, Lord Roberts; Hon. Lord Dawson, Physician to His Majesty was given the same distinction by the Council of the Royal College of Surgeons of England.

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

C. B. JORDAN—CHAIRMAN OF EXECUTIVE COMMITTEE, A. A. C. P., EDITOR OF THIS DEPARTMENT.

"Teachers of pharmacy have for years had difficulty in the exact definition of terms applied to certain courses, especially those that have been placed under the general heading of Materia Medica. The report of the Committee on Curriculum and Teaching Methods presented at the 1930 meeting of the A. A. C. P. (see 1930 Proceedings, pages 58–73) emphasized this difficulty and the Committee recommended that the old term 'materia medica' be abandoned because of lack of definite significance. This was accepted by the Association. The following paper by Dean Bliss further emphasizes the importance of care in the use of terms, especially in the description of courses in colleges of pharmacy. This paper is an abstract of the material submitted by Dean Bliss as chairman of the Teacher's Conference on Materia Medica at the last meeting of the Association."—C. B. JORDAN, *Editor*.

THE TERM "PHARMACOLOGY," ITS MEANING, AND THE SCOPE AND CONTENT OF A COURSE IN PHARMACOLOGY FOR PHARMACY STUDENTS.

BY A. RICHARD BLISS, JR.*

Following the suggestion made at the last Conference, we have decided to attempt to find out what we have been actually teaching under the titles "Pharmacology," "Materia Medica," "Pharmacognosy!" Is the professor himself becoming educated? Someone has said that education is one of the most painful, delicate and private operations in the world. It is not imposed from above; it is acquired from below. It is not found in any formal program, but is almost a by-product. It is, after all, what happens to you!

When the writer of this paper was requested to compile an Outline of Pharmacology for the tentatve draft of the new Pharmaceutical Syllabus, he undertook the task assigned to him in a spirit of service. In order to secure as representative an expression of opinion as possible, the author mailed a communication to all of those individuals who are in charge of departments of or courses in Pharmacology or Materia Medica in the schools of pharmacy of the United States of America and Canada, in which he asked the following questions:

First: What is your definition of the term "Pharmacology?"

Second: What is your definition of the term "Materia Medica?"

Third: College of pharmacy catalogs carry the terms "Pharmacology," "Pharmacodynamics," "Pharmacognosy," and "Materia Medica" in defining the same course. What term do you feel should be employed to label a course which embraces the titles, definitions, constituents, solubilities, odor, taste, color, state of matter and doses of drugs and chemicals, and similar data concerning their preparations and derivatives?

Fourth: If, in addition to the foregoing (in "Third" immediately above), the actions (pharmacodynamics) and uses of the drugs are included, what term, descriptive of the course, should be used?

* Dean, School of Pharmacy, University of Tennessee; Chief, Division of Pharmacology, Colleges of Medicine and Dentistry, and School of Pharmacy, Memphis.

The answers to these communications may be assumed to represent the collective opinion of the instructors who are actively engaged in teaching the courses in Pharmacology, Materia Medica, etc., and are decidedly valuable data.

The variations in the school- and college-catalog titles of courses in Pharmacology, Materia Medica, Pharmacognosy, Pharmacodynamics, prompted the author to compile the following definitions:

Webster's New International Dictionary of the English Language gives the following information:

(1) "phar'ma-co- (fär'mà-kŏ-)" is the "combining form from Greek φάρμακον, drug, medicine, poison."

(2) "phar'ma-col'o-gy (-jĭ), *n.* (pharmaco- + -logy.) The science of drugs, including materia medica and therapeutics."

(3) "phar'ma-col'o-gist (fär'mà-kŏl'ŏ-jĭst), *n.* One skilled in pharmacology."

(4) "ma-te'ri-a med'i-ca (mà-tē'rĭ-a mĕd'ĭ-kà). (L. See MATTER; MEDICAL.) 1. Material or substance used in the composition of remedies; a general term for all substances used as curative agents in medicine. 2. That branch of medical science which treats of the nature and properties of all substances employed for the cure of diseases; one of the two branches of pharmacology."

(5) "ther'a-peu'tics (-tĭks), *n.* (Cf. F. thérapeutiqui.) That part of medical science which treats of the discovery and application of remedies for diseases."

(6) "phar'ma-co-dy-nam'ics (-dī-năm'ĭks; -dĭ-), *n.* (*pharmaco-* + dynamics.) That branch of pharmacology which treats of the action and the effects of medicines."

(7) "phar'ma-cog'no-sy (-kŏg'nō-sĭ), phar'ma-cog-no'sis (-kŏg-nō'sis), *n.* (*pharmaco-* + Gr. γνῶσις a knowing.) Pharmacology, or esp. that branch of it treating of the characteristics of crude drugs and simples."

(8) "phar'ma-co-pe'di-a (fär'má-ko-pē'dĭ-a), *n.* (NL.; *pharmaco-* + Gr. παιδεία education.) Instruction concerning medicinal drugs and preparations; the science of drugs."

(9) "phar'ma-co-pe'dics (-pē'dĭks; -pĕd'ĭks), *n.* The scientific study of medicinal drugs and preparations."

(10) "phar'ma-cog'ra-phy (-kŏg'rà-fĭ), *n.* (pharmaco- + -graphy.) A scientific description of drugs."

The replies to the letter disclosed the facts that exactly two-thirds of the instructors who replied follow the medical textbooks "restricted" definition of Pharmacology, while the remaining third adhere to the "broad" definition.

Most of the authors quoted define Materia Medica as the study of the properties of drugs (crude drugs, agents, appliances, medical materials), including their titles, origin, structure, composition, classification and identification (*Pharmacognosy*), their actions (*Pharmacodynamics*), their uses (*Therapeutics*), their doses (*Posology*), their preparations and derivatives and the doses of the same, and, in cases of toxic drugs, their poisonous actions (*Toxicology*). It is evident that these authorities consider the term "Materia Medica" as a synonym for Pharmacology in its "general or broad sense."

Two-thirds of the instructors who replied to the letter agree with the "general" or "broad" definition of Materia Medica. In one institution the term is not defined, but simply used as a departmental or divisional title or heading. Two instructors insist that the term "Materia Medica" should be used only in the sense of a list of materials employed in the treatment of disease.

In reply to the third paragraph of the letter:

> "College of pharmacy catalogues carry the terms 'Pharmacology,' 'Pharmacodynamics,' 'Pharmacognosy,' and 'Materia Medica' in defining the same course. What term do you feel should be employed to label a course which embraces the titles, definitions, constituents, solubilities, odor, taste, color, state of matter, and dose of drugs and chemicals, and similar data concerning their preparations and derivatives?"

One-third used the term "Materia Medica," one-third employed "Pharmacognosy," and the terms "Pharmacology," "Descriptive Materia Medica," "Official Pharmacy and Pharmacognosy" were suggested by one instructor in each case.

The replies to the fourth paragraph of the same letter:

> "If, in addition to the foregoing (in "Third" immediately above), the actions (pharmacodynamics) and uses of the drugs are included, what term, descriptive of the course, should be used?"

showed 22% in favor of the term "Materia Medica," the same number favoring the term "Pharmacology," and one instructor each in favor of the following: "Pharmacodynamics," "Pharmacology and Pharmacodynamics," "Pharmacology *or* Materia Medica," "Pharmacognosy *and* Materia Medica," "Pharmacology and Therapeutics," "Pharmacology and Pharmacognosy," "Pharmacodynamics and Therapeutics." The terms were used in the following frequency order:

Pharmacology, 9
Materia Medica, 6
Pharmacodynamics, 5
Pharmacognosy, 3
Therapeutics, 3

The instruction concerning medicinal agents offered by the schools of pharmacy is not given by any *one* department or division, but instead is taken care of *in part* by Chemistry, Botany, Drug Assaying, Pharmacy, Bacteriology, Physiology, Pharmacognosy and "Materia Medica" or "Pharmacology." These subjects, however, do not cover all of the instruction deemed fundamental and essential. None of the instruction concerning drugs offered by these departments or subjects is complete or sufficient in itself. Neither would the consolidated material given in these courses represent that modicum needed by the pharmacy student. It would not be practical or desirable to attempt to attain the desired results by expansion of all of these courses. The schools of pharmacy, consequently, have attempted to consolidate, correlate, strengthen and elaborate the study of drugs, which is offered in part by each of the departments or subjects listed above, by giving courses entitled "Pharmacology," "Pharmacodynamics," "Therapeutics," etc. All are agreed as to the desirability of uniformity in the title of such a course. There is a diversity of opinion among those giving this instruction as to the best title. There is little, if any, serious difference of opinion about the general content of such a course, the overlapping of the instruction in Chemistry, Pharmacognosy, etc., the inclusion of *some* instruction in pharmacodynamics and in therapeutics as a part of the course, and the necessity for and the desirability of having such a course even though there may be included some logical repetition and duplication. This course should take up all of the drug strands woven by other courses

and the loose ends, add needed strands to them, strengthen them where need be, and weave all into a united whole.

The suggestion has been made that a word be "coined." The chairman of this Section is not in favor of such a plan, particularly in view of the fact that authority is available warranting the *correct* use of a term as a title for the course in question. Webster's International Dictionary defines "Pharmacology" as "The science of drugs including Materia Medica and Therapeutics." In this sense the term "fills the requirements." Why worry about the "restricted" use of the term by some? How did the use of the term "Pharmacology" as a synonym for "Pharmacodynamics" come about; is it correct; and where is the authority for such use? We, therefore, believe that the term "Pharmacology" is highly satisfactory and appropriate as the title of a course, the scope and content of which have been outlined above.

The functions of the course in Pharmacology are: (1) To bring together certain information and facts concerning drugs and other agents which have been developed in other courses of the curriculum, such as Pharmacognosy, Chemistry and Pharmacy, to correlate this material, to organize it preferably according to some "use" (therapeutic) classification. (2) To elaborate this material where necessary. (3) To add to the list of substances studied in the other courses such materials as are warranted by common usage, "New and Non Official Remedies," "Useful Drugs" and the "Recipe Book" of the AMERICAN PHARMACEUTICAL ASSOCIATION, since it is patently impossible and undesirable for other departments or courses to include, individually or collectively, *all* of *the materia medica* as a part of their instruction. (4) To acquaint the student with the common or major *therapeutic and other uses* of the drugs and other materials the pharmacist sells and dispenses, the *reasons for such uses*, and the *manner in which they are effective*, keeping always in mind the facts that (*a*) it is more important that the pharmacodynamic and therapeutic information of the pharmacist should be sound than it should be either deep or extensive, and (*b*) that the pharmacist should possess a synthetic conception of the important actions of all important drugs, but more particularly the toxic ones. (5) To familiarize the student with the doses of drugs, and the proper methods of administration and application. (6) To familiarize the student with the more readily recognizable symptoms of poisoning by the most common and important poisons, and with the preliminary emergency steps useful in the treatment of cases of poisoning. (7) To impress the student with the necessity for continuous care and caution in handling and dispensing the numerous substances which are very toxic, especially those which may easily be mistaken for less potent ones, and to convey similar information to purchasers of such substances. (8) To acquaint the student with those methods of bioassay found in the U. S. Pharmacopœia.

Experience and study have shown that the course can be handled more profitably and more economically by treating the subject matter as a whole, than by separating the material into subject divisions. Accordingly, the following plan of treatment is suggested:

I.—*Group Treatment:*

1. Definition of the group title. 2. History of the group.

3. General pharmacodynamics of the group. 4. General therapeutics of the group.
5. General toxicology of the group; Poisonous actions, symptoms, antidotal treatment, dangers involved in antidotal treatment.

In discussing the pharmacodynamic and therapeutic portions of the course it will be found most satisfactory to discuss first the general pharmacodynamics and general uses of each class, group or subgroup, bringing out any special or individual differences in actions or applications when the other facts concerning the individual agent are taken up.

A similar synoptic presentation of the toxicologic portion will be found highly satisfactory, leaving any special or detailed toxicology of individual drugs for discussion when the agent itself is discussed.

NOTE: In taking up the pharmacodynamics, the therapeutics and the toxicology, the material should be presented to the student in such a fashion as to show conclusively that the object of this instruction is *not to fit the pharmacist for the treatment of disease, but instead to teach the student the broad principles which guide therapeutics, the objects to be accomplished, and the agencies that may be employed.* Sollmann says (in "The Action of Drugs"): "To the sensible and tactful pharmacist, some knowledge of these matters (actions, uses and doses) is very useful, and indeed necessary. As a tradesman, the public expects him to be familiar with the uses to which his wares are commonly put, and with the manner of their use. As a professional man, he can coöperate with the prescribing physician much better if he has an intelligent understanding of the broad principles which guide treatment, of the subjects which are to be accomplished and of the means that are utilized. The pharmacist himself will be protected against many blunders in the exercise of his higher professional function, the compounding of prescriptions. He will be able to protect the public against the errors of others, as well as his own. He may, by the exercise of some tact, put the physician under lasting obligations. In cases of poisoning, he has often the opportunity to institute correct preliminary treatment which may decide the patient's life."

II.—*Individual Agent Treatment:*

1. Latin and English titles, abbreviations, synonyms, definitions, standards, origin, preparation, preservation and physical properties including solubilities.
2. Constituents.
3. Special pharmacodynamics.
4. Special uses.
5. Dose.
6. Preparations and doses.
7. Special toxicology.

Printed outline forms may be used to advantage by the student. The items in the first, fifth and sixth paragraphs above, in the cases of U. S. P. and N. F. substances, are found in those volumes and entered on the forms by the student. The other items are supplied and discussed by the instructor.

Laboratory Work (*Experimental Pharmacodynamics and Bioassaying*).—The laboratory courses in Pharmacy, Chemistry, Botany, Toxicology, Bacteriology and Pharmacognosy provide a large portion of the "practical" or laboratory work of the course in Pharmacology, with the exception of the Pharmacodynamics, certain portions of the Toxicology, and the Bioassays. Consequently, the remainder of the laboratory portion of the course in Pharmacology should consist of (*a*) a study of gross specimens of the materia media; (*b*) elementary Experimental Pharmacodynamics; and (*c*) Bioassaying.

PHARMACY IN RETROSPECT.*

BY HUGH C. MULDOON.[1]

Pharmacists are not skilled in the arts of personal and professional publicity. They are not propagandists. Seldom is their work spectacular or dramatic. As a class they are inarticulate, making little effort to tell the public about themselves and their work. Consequently many people fail to appreciate the true worth of the pharmacist and the service he renders.

Prevailing ideas regarding modern pharmacy and those who practice it are often far from the truth. People unconcernedly place their lives in the hands of their pharmacists, yet they really know very little about them, their knowledge, their skill, their training, their integrity, their legal control and supervision, their professional contacts. Because of this lack of knowledge and because of misinformation, pharmacists are sometimes disparaged, often misunderstood and sometimes condemned unfairly.

People who judge superficially, who take manifestations for essentials and manner for being, may not even believe that pharmacy is a profession; yet it has well-defined moral and ethical responsibilities; it has a body of expert knowledge not possessed by others outside of pharmacy; and as time goes on this special knowledge increases through research. Pharmacy has an impressive literature and an important group of distinguished educational institutions. The practice of the calling requires initiative, judgment and independent thought as well as a definite technique. These, we are told, are the marks of a true profession. Pharmacy has them all, but far too many people are not aware of it.

Only those who have been in close contact with the profession realize the enormous strides that have been taken in pharmacy during the past quarter century. Revision, advance, improvement, extension have followed each other in rapid succession until the training and education and status of the pharmacist are quite different from what they were when this branch of the A. PH. A. was founded. Advances have been made in the fields of organization, legislation and education; and it is a source of congratulation that the progress has been made voluntarily by pharmacists themselves, and not as a result of pressure by some outside agency.

This branch of the A. PH. A., situated strategically at the crossroads of the world, has had a unique opportunity to observe and study and appraise the advances that have been made. It has done more; it has been an active leader in demanding and effecting the changes.

Twenty-five years ago practicing pharmacists were often lonely men so far as other pharmacists were concerned. A competitor was considered a personal rival, a man with whom one would not be friendly, a man from whom one could not afford to learn. But as time showed the very real need for pharmacists to band together for mutual aid and protection, groups such as this, local, sectional, state and national, were formed in increasing numbers. Just before the inception of this branch, the N. A. R. D. was established to serve the commercial interests of the pharmacist. In 1900 the A. A. C. P. was organized. In 1904 the N. A. B. P. was formed. In the organization and conduct of all these organizations the members of the New York Branch have played a prominent part.

National and local organizations, including this particular group, have been active in securing legislation to protect the pharmacist and the public. They have fought for higher educational requirements. They have encouraged scientific pharmacy and pharmaceutical research. This New York Branch has the distinction of being the first to make an annual award for distinguished service to pharmacy—the Remington Medal—a fine recognition of the worth of a great pharmacist.

Of all the professions, pharmacy is the most carefully regulated by law. The many legal safeguards thrown around the profession show how highly important the work of the pharmacist is. There are regulations concerning the preliminary training of the pharmacist, the approval of colleges and the courses they offer, the licensing of graduate pharmacists, the registration, conduct and inspection of pharmacies, the sale of poisons, the adulteration of drugs and a hundred other things. These regulations are established by law or by ruling of State Boards of Pharmacy. For

* An address at the 25th anniversary dinner of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, at Hotel Pennsylvania, March 14, 1932.

[1] Dean of the School of Pharmacy, Duquesne University, presiding officer of the College of Pharmacy group of District No. 2.

many years the New York Branch has been represented continuously on the New York State Board of Pharmacy, and these representatives together with other members of the Branch have worked long and faithfully in the cause of legislation.

The New York Branch has seen the passing of important national laws which have influenced the work of the pharmacist. The Pure Food and Drug Law of 1906, the Harrison Anti-Narcotic Act of 1914, the Prohibition Amendment and the Volstead Act of 1919 have all had marked effects. Prohibition has been almost tragic in its consequences. Whether he approved or not—and he did not—the pharmacist was made the legal distributor of liquor to the public. Petitioned by pharmacists, the government would provide no relief. In hordes, undesirables were attracted to the profession and upright pharmacists suffered. The obtaining of alcohol in small quantities was made so difficult that many retail pharmacists were unwilling any longer to prepare the remedies they had been accustomed to make. Manufacturing was diverted to the great commercial houses at a time when the pharmacist is better trained than ever before to prepare his own medicines. Professional pharmacy suffered a staggering blow. Modification of the prohibition laws seems inevitable. Relief for the pharmacist will come eventually, but the damage cannot be undone.

The New York Branch has always been keenly interested in education. Its efforts for a better and more satisfactory educational program have met with a measure of success. Since the turn of the century the advances in pharmaceutical education have been little short of amazing. New York was the first state to demand college training for pharmacists, and it established the requirement before all the other states were requiring college graduation even for physicians. Until 1918, even in New York state, only one year of high school preparation was required for entrance to a college course which then occupied two short school years of three days a week. Since 1925, four years of high school work have been demanded. The college course was later extended to three years, and beginning in September of this year, a minimum four-year course will be established in most of the schools of the eastern district represented here to-night.

The new curriculum will enable the colleges to give pharmacists a more adequate background, a broader culture and more diverse interests. Education in pharmacy will no longer be purely vocational. Student pharmacists should have an acquaintance with some of the finer things of life so that they may intelligently set up the high standards to which they should aspire, standards of excellence and merit by which they may appraise thought and action.

For almost the first time in pharmaceutical education, the student pharmacist will be permitted to elect a portion of his study program, enabling him to do special work in certain fields which may interest him. Until now the ordinary curriculum in pharmacy has been a Procrustean bed to which all students were forced to conform. Education is aimed at developing the talents and abilities bestowed upon us at birth. Since all men are not equally endowed, the personality and individuality of the student should be considered and respected. The man should finish college an educated individual, not a standardized unit. The new liberalized curriculum should train men to be bold, independent thinkers, men with minds which are not docile, men who dare question precedent and authority, men with ability to meet new situations.

Some of the finest pharmaceutical educators of this country, some of the greatest teachers of the century, are teachers in the five colleges of pharmacy of this district and members of this New York Branch of the A. PH. A. I need not point them out to you. For many more than twenty-five years some of these men have been teaching pharmacists in the classroom and in the laboratory. They have themselves been actively engaged in research as well. They know that progress depends upon the discovery of new truth. The researches of these men may have been in pure or applied science. They may have been botanical, chemical, physical or pharmaceutical in character. The work may have been studies in the history or the literature of pharmacy; it may have been the botanical exploration of foreign countries, or the large-scale manufacturing of pharmaceuticals, or the assay and standardization of medicinals or studies of their adulteration; it may have been experimentation to improve the quality, uniformity, preservation and mode of administration of simple drugs, but in any case the research was superlatively well done by these scientists who are honored members of your group. Their accomplishments are known and appreciated not only locally and nationally, but throughout the world. Their influence will be felt for years to come, for they have taught to others the joy of creation and the pride of accomplishment.

It is by pharmacists such as these men that we ask that our profession shall be judged; by our best not by our poorest; not by our occasional incompetents, not by those blatantly commercial pharmacists who have little appreciation of the high responsibilities of their calling; not by our fringe of disreputables, renegade pharmacists who subscribe to no code of ethics. We want rather to be judged by that great body of upright pharmacists who can justly employ the motto of the old English apothecaries—*Opiferque per orbem dicor*—"And I am called the bringer of help throughout the world."

That motto applies most aptly to the members of this group, men who constantly strive to insure that the best traditions of our profession shall be honorably sustained.

We of the colleges, who are your guests, congratulate you upon having completed so creditably a quarter century of existence. Although your group would be justified in viewing the past with some measure of complacence, we know that you are rather looking forward into the future, considering the important tasks that are still ahead of you, many of which we feel sure will have been brought to a successful conclusion before we all meet together again in 1957 at your golden jubilee.

You have our best wishes.

PHARMACY IN PROSPECT.*

BY ROBERT P. FISCHELIS.[1]

To a profession which measures the length of its services to mankind in terms of centuries, the celebration of a twenty-fifth anniversary may seem to be an event of small moment. It is doubtful, however, whether the forty centuries of recorded pharmaceutical history reveal any more startling changes in the practice of the healing arts than have come about in the twenty-five years since the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was organized. It is altogether fitting and proper, therefore, that as we round the quarter-century mark in the history of this organization, we pause for a moment to view the past in retrospect and to gaze as far as possible into the fog which veils the future. The presence here to-night of the teachers of pharmacy from the College faculties of New York, Pennsylvania, Maryland, Delaware, New Jersey and the District of Columbia and of the examiners and officers of State Boards of Pharmacy of the same political divisions, as guests of the New York Branch, lends to the occasion a scientific and professional atmosphere which emphasizes the importance of pharmacy in the field of medical care. The character of the technical discussions held by these respective groups during this day and to be continued to-morrow indicate the seriousness with which those who are engaged in teaching and testing pharmacists approach their responsibilities to the public. One needs only to glance at the program of papers and committee reports to realize that the duty of providing the public with competent pharmacists is indeed a serious business.

How far we have come in the past twenty-five years has been splendidly outlined to you by Dean Hugh C. Muldoon of the College of Pharmacy of Duquesne University. To tell you where we are going from here is the task assigned to me. The difficulties of the task are obvious. Yet we are in a better position to prognosticate in 1932 than we were in 1907. This is true only because for a number of years, fact-finding surveys have been under way in pharmacy as in other fields of endeavor. We may still guess but our guessing has been stabilized and improved through an accumulation of facts which, when classified, point to certain trends that show the direction in which men and things are heading.

It has been my pleasure to be associated for a number of years with the Committee on the Costs of Medical Care headed by Dr. Ray Lyman Wilbur, Secretary of the Interior, which was organized nearly five years ago to study the economic aspects of the prevention and care of sickness, including the adequacy, availability and compensation of the persons and agencies concerned.

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* An address by the president of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, at the 25th anniversary dinner of the New York Branch, A. PH. A., at Hotel Pennsylvania, March 14, 1932.

[1] Presiding officer of the Board of Pharmacy, group of District No. 2, vice-president of the National Association, Boards of Pharmacy.

The widest possible scope has been given the work of the Committee. It has been notably free from pressures of any kind. Its support has come from individuals, professional associations, life insurance companies and such philanthropic organizations as the Carnegie Corporation, Milbank Memorial Fund, Twentieth Century Fund, Russell Sage Foundation, Rockefeller Foundation, New York Foundation, Josiah Macy, Jr., Foundation, Julius Rosenwald Fund, Vermont Commission on Country Life and Social Science Research Council. Close to a million dollars will have been spent by the Committee in the researches carried on and in dissemination of the information developed over the five-year period.

For more than three years the manufacture and distribution of drugs and medicines in the United States and the Services of Pharmacy in Medical Care have been studied carefully and impartially by the Research Staff of this Committee. The study was started without any preconceived notions as to the prominence or lack of prominence of Pharmacy in the field of medical care. Many unusual sources of reliable information were at the disposal of the investigators and full use was also made of facts developed in connection with other studies undertaken by the Committee.

This study, which constitutes a survey of Pharmacy in its professional and business aspects, has been completed and will be published this month. It reveals a number of interesting facts, all of which point directly to the future of Pharmacy in the United States. In the limited time at my disposal I can only point to some of the more outstanding ones.

To those who visualize professions and industries in terms of expenditures by the public for services rendered or commodities provided, Pharmacy will immediately assume an important position when it is revealed that the public spends something like $715,000,000 annually for medicines alone. Of this total, approximately $190,000,000 is spent for physicians' prescriptions; about $165,000,000 is spent for non-secret home remedies; and about $360,000,000, which is nearly 50% of the grand total, is spent for so-called "patent medicines" of secret composition.

All but about 15% of the total expenditure for medicines is made through the retail drug stores of the United States. There are about 60,000 pharmacies in the United States, where the 115,000 Registered Pharmacists practice their profession. These Registered Pharmacists have passed state examinations designed to prove their competence as compounders and dispensers of drugs and medicines. However, a large part of the time of the average Registered Pharmacist in the ordinary retail drug store of the United States is spent in carrying out duties other than the compounding and dispensing of drugs and medicines.

The average family of four persons spends about $22.00 a year for medicines. The actual per capita expenditure varies greatly and tends to increase with the income level of the family, regardless of the type of community. Practically every family spends something for medicines each year and the expenditures tend to be highest in the cities.

The incomes of pharmacists are meagre, averaging about $2000 per annum for Registered Pharmacists employed in the ordinary drug store. The incomes of owners of pharmacies, managers of chain store organizations and pharmacists engaged in manufacturing and executive positions are, of course, considerably higher. A pharmaceutical education costs from $2500 to $3000, including only the absolute essentials.

It is estimated that approximately 10,000 pharmacists could fill the 165,000,000 physicians' prescriptions written annually, provided they were engaged in no other pursuits. Limiting the compounding of prescriptions to 10,000 pharmacists in as many pharmacies, however, would leave many communities without pharmacists and would spread the number of pharmacies in larger communities in such a manner as to make it inconvenient for the public to obtain prompt prescription service. It is because the modern drug store engages in merchandising activities as well as in the professional activity of compounding medicines and dispensing prescriptions that the services of Registered Pharmacists are available to the general public in small communities and in so many convenient places in the larger cities.

Pharmacists who desire to practice their profession exclusively and who do not care to engage in merchandising must seek their opportunities in manufacturing laboratories, hospital pharmacies and in the small group of pharmacies specializing almost exclusively in prescription work. There are less than 2000 of such pharmacies within the United States.

The manufacture and sale of secret formula "patent medicines" and of the specialties whose formula is partially revealed offer many problems affecting the costs of medical care. It is

estimated that probably 80% of the money spent for patent medicines is spent unwisely because it is spent without medical advice of any kind. The patient acts as his own doctor in diagnosing his ailment and comparing his symptoms to those held out in the advertisement of the patent medicine. Frequently this procedure may result in withholding proper medical attention until it is too late to effect a cure. The medical profession as well as the pharmacal profession is opposed to the principle of self-medication. The AMERICAN PHARMACEUTICAL ASSOCIATION, through its Commission on Proprietary Medicines, has formulated certain standards which must be met in order to bring the product within the pale of legitimate remedies.

In view of the shifting of control from professional to financial hands manifested by recent developments in the drug industry, regulations for the protection of the public are more necessary than ever. At the present time no adequate control is exercised by any federal or state agency over the manufacture of medicines. There is federal control with reference to labeling and the disclosure of the presence of certain poisons and habit-forming drugs, but there is no adequate control over advertising or over the manufacturing personnel. The disclosure of the formula of all medicines offered for sale to the public appears to be a basic need for the proper regulation of the medicine industry.

Regulations covering the pharmaceutical profession and the practice of pharmacy by pharmacists are strict enough, but the privileges of unlicensed persons operating outside of pharmacy are so extensive that the public enjoys little protection in the sales of packaged medicines.

While self-medication is on the increase, there is not available sufficient authentic information on which the public can base its judgment as to what particular types of medicine may be used for the treatment of simple and minor conditions with safety. The active coöperation of the medical and pharmacal professions is advocated to provide for the preparation and distribution of such information.

Recommendations for the future development of pharmacy which grow out of the survey referred to are as follows:

I. More adequate use should be made of the professional knowledge and skill of pharmacists by such methods as: (*a*) Increasing the opportunities for prescription compounding through elimination of the prescribing of proprietary products by physicians: (*b*) Permitting the instruction of drug-store customers in the proper use of medicines which are purchased for self-medication, but not to the extent of diagnosing patients' ailments or recommending medicines based upon description of symptoms: (*c*) Arranging for the distribution by the pharmacist of general health information prepared by health departments, both with regard to medicines and general matters of hygiene: (*d*) Arranging for the distribution of information to the public concerning physicians and hospitals, on the basis of lists of physicians or schedules of fees provided by local medical or hospital associations.

II. Agencies should be established to prepare and disseminate accurate information concerning the proper use of selected lists of home remedies appropriate for self-medication. The lists should be established by a committee of physicians and pharmacists of unquestioned reputation and standing; the distribution of literature may be accomplished by health departments, hospitals, drug stores or appropriate lay associations. Universal and unnecessary use of home remedies, "patent medicines" and other self-prescribed medicine should be rigorously discouraged.

III. All manufacturers of drugs and medicines, regardless of class or kind, should be required to operate under annual licenses to be granted by the Federal Government upon the fulfilment of satisfactory conditions with regard to competency of personnel, equipment and sanitary surroundings, and standardization of finished products.

IV. Secret-formula drugs and medicines should be abolished through the compulsory disclosure on the label of the kind and quantity of medicinal ingredients. Individuals or enterprises which have developed new and distinct preparations should be financially protected by appropriate privileges granted by the United States Patent Office or by a disinterested agency established for the purpose.

With this survey of Pharmacy and its far-reaching recommendations, endorsed by the Committee on the Costs of Medical Care, before us, I may perhaps be pardoned for venturing a prophecy as to what developments we may look forward to in the next twenty-five years.

The public will continue to support the modern drug store and will expect it to supply many non-medical services along with complete pharmaceutical service. There will be an increasing realization, however, that the "jack of all trades," although frequently a convenience, is to be avoided when the services of a master pharmacist are required. Prescription specialists will be sought out just as medical specialists are now given preference to the general practitioner. The corner drug stores will be the base of operations of the general practitioner in pharmacy. He will become more and more a dispenser of ready-made drugs and medicines. He will refer demands for unusual prescriptions and other pharmaceutical service to the specialist, just as the general practitioner of medicine refers unusual cases to the specialist. The pharmaceutical Code of Ethics will have to be developed to cover the new conditions as they arise.

The pharmaceutical specialist will work in close harmony with physicians. He will be located near medical centers and will frequently be affiliated with them. His base of operations may be a laboratory in a physician's office building, a hospital laboratory or a prescription pharmacy in a busy section of a city.

As health insurance schemes and industrial or State medicine develop, opportunities for the practice of professional pharmacy in these respective fields will become available and will be seized by well-trained pharmacists who now hunger for a chance to practice their profession. Advice on preventive measures, diet and health regulation will be sought and obtainable from the pharmacist. Education of the pharmacist will gradually swing from the narrow field of drug therapy to the broader field of health conservation in all its phases. The present courses in pharmacy will be found inadequate for training the pharmacist who desires to meet the needs which modern medical practice will demand of him. Radical changes in curricula will be demanded and graduate instruction will become an inevitable prerequisite for the practice of pharmacy in its strictly professional aspects. The business of conducting a Pharmacy and the professional Practice of Pharmacy will be gradually divorced. Both will be honorable pursuits engaged in by men of decidedly different inclinations and training but with health service to the public as their common aim.

SOME PROFESSIONAL PHARMACY FACTS DERIVED FROM THE NATIONAL DRUG STORE SURVEY.*

BY FRANK A. DELGADO, BUSINESS SPECIALIST, BUREAU OF FOREIGN AND DOMESTIC COMMERCE.[1]

The prescription department is the foundation of the drug store; it is the prestige department, the department that furnishes an outlet for the pharmacist's professional knowledge. It is the one thing that distinguishes a drug store from other types of retail outlets, and no discussion of the business side of the drug store should be entered upon without due consideration that pharmacy is a profession.

In recognizing the professional phase of pharmacy it has been customary to contrast it with the commercial aspects of the retail drug store. It would be more accurate perhaps to consider that most departments of the store have both professional and commercial aspects. The term merchandising broadly defined has the two phases of cost control and sales promotion. Much has been said about properly merchandising those departments in the drug store not related to public health. Perhaps it is time to point out that the possibilities for greater sales and profits through cost control and sales promotion in the prescription department are as worthy of consideration as in any other part of the drug store.

It is certain that variations in costs of materials and in inventory and the establishment of prices which will permit the filling of prescriptions at a profit present problems quite as difficult as the maintenance of proper accounting control on packaged drug store merchandise. Attractive

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* Department of Commerce, Washington.

[1] An address delivered at the Second Annual Druggists' Business Conference held at Purdue University, Lafayette, Indiana, February 24 and 25, 1932.

and sanitary appearance of the store has just as much importance in creating prescription business as in creating fountain business. The prescription department should certainly be granted its place in advertising and window display. There is even a proper opportunity for direct sales suggestion in the conduct of this phase of the business. Even for the druggist who may not desire to suggest remedies it can scarcely be questioned that he may with all propriety suggest the purchase of such auxiliary items as fever thermometers, hospital supplies, first-aid equipment, rubber sundries and numerous other items associated with the preservation of health.

Plans have been announced for a two-day conference of retail pharmacists, wholesalers, manufacturers and pharmaceutical educators to be held in St. Louis, Missouri, April 26th and 27th at which time the application of the results of the survey now being conducted in St. Louis by the United States Department of Commerce in coöperation with the National Drug Store Survey Committee will be discussed.

Field work in St. Louis will be completed with a final inventory April 1st, although analysis of statistics and publication of reports will occupy an additional year. However, at least three chapters of the study on store arrangement, causes of bankruptcy and the drug store package are expected to be published in pamphlet form by the time of the April meeting. It is also expected that the first part of the prescription report dealing with volume and entitled "Prescription Department Sales in Selected Drug Stores" will be available for distribution. Also there will be detailed consideration of customer problems and other phases of the survey farthest advanced.

RESULTS TO BE NATIONAL IN THEIR APPLICATION.

Before reviewing a few of the Survey findings in the prescription department, which is the theme of this paper, it should be emphatically stated that although St. Louis is the laboratory where the distribution problems of the approximately 15,000 items sold through retail drug stores will be analyzed, the results will be by no means necessarily local in their application.

METHOD AND DIVISION OF PRESCRIPTIONS FILLED ANNUALLY INTO 1. NEW NON-NARCOTIC 2. NEW NARCOTIC 3. REFILLS 4. LIQUOR.

It was ascertained that during the fiscal year May 1, 1930, to April 30, 1931, the 11 independent and 2 chain stores being studied filled 84,088 prescriptions, divided as follows: 54,302 or 64.5 per cent new prescriptions; 18,726 or 22.2 per cent refill prescriptions; and 11,060 or 13.3 per cent liquor prescriptions. The 54,302 or 64.5 per cent new prescriptions were divided into 46,480 non-narcotic and 7822 narcotic prescriptions. Over 44 per cent of the 54,302 new prescriptions just mentioned were analyzed.

Instead of studying an equal number for each month in the year, seasonal variations were considered and a larger number were analyzed for the winter months (December to April, inclusive) then the summer months (May to November, inclusive). The subject of seasonal variations is dealt with elsewhere in this paper.

During the conduct of the prescription analysis a conscientious effort was made to check or compare the facts regarding refills, average prices and average number of prescriptions filled per store, and the division of prescriptions into narcotics and non-narcotics with the results of other prescription surveys.

AVERAGE NUMBER OF PRESCRIPTIONS FILLED DAILY BY TYPE.

The 13 usual commercial type stores are filling an average of 15.4 prescriptions per day each exclusive of liquor prescriptions divided 11.4 new and 4 refill prescriptions. The proportion of new prescriptions represented by narcotic prescriptions approximated 15 per cent.

The information compiled regarding narcotics shows that nine of the thirteen stores had the problem of filling narcotic prescriptions and complying with the provisions and requirements of the Harrison Narcotic Law, also State pharmaceutical poison laws arise at least once a day.

PROFESSIONAL STORE FINDINGS SHOULD FURNISH TRENDS.

In addition to the 23,963 prescriptions already referred to, we are analyzing 10,000 more from two professional pharmacies.

The findings for the professional stores will probably be published separately and only a few are available at present. The original plans did not call for the inclusion of a professional type store, but it was realized that the failure to do so would constitute a serious omission, due

to the fact that among other reasons prescriptions filled by professional pharmacies cover a wider range. Such prescriptions are written by physicians with a varied practice, including specialists in every field of medicine, and filling them requires a much larger stock and a wider range of ingredients.

However, a well-stocked prescription department doing a large business does not guarantee the proprietor that he will be able to fill all prescriptions presented. This fact was brought out in an interview with the manager of a well-stocked St. Louis professional pharmacy who stated that he was presented with a prescription at least every other day containing ingredients not stocked. He attributed this condition to the large number of manufacturers' specialties constantly being put on the market and detailed to physicians.

This pharmacist expressed the opinion that no drug store could hope to achieve the Utopian ideal of maintaining a complete enough stock to fill all prescriptions presented and that the best that could be done was to keep supplied with the materials generally prescribed by those physicians whose patients normally patronize the store.

An interesting fact that is ascertainable from the study of the professional drug stores is that 7 per cent of their prescriptions are the private formula type, whereas this type of prescription is apparently negligible in the usual commercial type drug stores.

Another reason for including the professional stores, was that one of the stores had been in business over 25 years, and by going back and analyzing a group of prescriptions filled twenty years ago, and another group ten years later and the remainder in the current year, changes in prices charged for prescriptions and other trends would be established.

The value of any study depends a great deal on the use made of it and the value of the information brought out by the prescription study will depend very considerably upon trends discovered. The best kind of a survey is, of course, a continuing survey or one made at convenient periods, and which thereafter will definitely show the trends. It is hoped that this and other similar studies will not only show the changes going on now, but will serve as an indicator that may be useful after the present survey has been completed.

Interesting preliminary findings that indicate certain unexpected trends are already being revealed as a result of the professional prescription store study. A partial examination of 2000 prescriptions divided equally between 1910 and 1920 show that while the number of different ingredients required to fill 1000 prescriptions increased only 14, or from 495 to 509, the number of different proprietaries prescribed decreased 14, or from 154 to 136, chemicals remained practically stationary being 155 for 1910 and 156 for 1920. However, there were 31 more galenicals and miscellaneous drugs prescribed, the number increasing from 156 to 187. (The figures and percentages mentioned are, of course, only preliminary, likewise any other figures that may be quoted are not to be considered final.)

An examination of those ingredients occurring during 1910 and 1920 disclosed among other things the names of a number of specialties that are not now being prescribed, having changed their character to proprietaries sold direct to the public.

PRESCRIPTION DEPARTMENT SALES GRATIFYING.

At this time when sales and profits in many lines of drug store merchandise are reduced, due to average smaller sales and the large number of so-called loss leaders, it would seem especially good business to concentrate efforts on one's prescription and other professional or public health departments.

The prescription volume is by no means a negligible part of total sales, and concrete evidence of this is brought out in preliminary figures available for 11 of the 13 commercial stores showing over 16 per cent of the sales are accounted for by prescriptions.

The sales figures just quoted do not include other merchandise of a prescription department of professional character such as biologicals, crude drugs and other items, the sales of which normally might be credited to the prescription department.

PRESCRIPTION DEPARTMENT BUSINESS OTHER THAN PRESCRIPTIONS.

In order to ascertain the extent of prescription department business other than actual prescriptions, a check was made for two months in one of the stores being studied of all sales of bulk drugs, chemicals, galenicals and other merchandise ordinarily stocked in the prescription depart-

ment and dispensed by a registered pharmacist. It was found that there was a daily average of 37 sales at 27 cents each or $10.10 per day. Or it might be stated that based on this particular store at least 25 per cent more must be added to actual prescription business, to obtain the total income of the prescription department.

This business should be profitable and moreover accounts, along with the manufacturing that takes place in the prescription department, for a considerable portion of the prescription clerks' time.

It has been said that the larger the number of prescriptions filled the greater the average price. The results of the St. Louis study do not altogether verify this statement, although there is a tendency in this direction. It was thought that when the results from the final store (a professional prescription store) to be studied was in, that perhaps the statement referred to above would check to a greater degree. However, despite the fact that this particular store charges very reasonable prices, and likewise fills a much greater number of prescriptions calling for expensive domestic and imported specialties, its prices were lower than those charged by the 13 usual commercial type stores. The average price charged for the 23,963 new prescriptions analyzed in the 13 usual commercial type stores was $0.92. The lowest average price charged was $0.82 and the highest $1.03.

The average price charged for narcotic prescriptions was $0.97 each, as against 0.91 for non-narcotic prescriptions. However, three of the stores charged less for narcotics.

PRICES OF OFFICIAL COMPARED WITH NON-OFFICIAL PRESCRIPTIONS.

The 20,533 non-narcotic prescriptions and 3430 narcotic prescriptions were further subdivided into three classes, namely (1) official U. S. P., or N. F., (2) proprietary or manufacturer's specialties, (3) mixed or a combination of official and proprietary.

It was disclosed that in the non-narcotic group the average price charged for prescriptions consisting exclusively of specialties was $1.02 or more than 21 per cent greater than the official prescriptions, the average price of which was only $0.84. The combination prescriptions averaged $0.93 or are 10 per cent more than the official. The most popular price charged for the prescriptions studied was $0.75 and occurred in 4434 prescriptions or 18.50 per cent of the total. There were only 248 prescriptions or 1.03 per cent of the total, priced in excess of $2.00.

APPROXIMATELY THREE PER CENT OF PRESCRIPTIONS PRICED UNDER FIFTY CENTS.

In connection with the subject of prices, it is interesting to note that out of approximately 24,000 prescriptions analyzed, 610 or 2.54 per cent were priced at less than 50 cents. Of the 610 prescriptions referred to above, 81 per cent were non-narcotic and 19 per cent were narcotics.

While it is realized that it is difficult in a number of cases to charge more than a nominal sum for an extremely simple prescription, it is believed that the pharmacist frequently loses sight of the fact that even the simplest prescription involves an exercise of professional knowledge and that more consideration should be given to a minimum compounding fee.

RATIO OF OFFICIAL PRESCRIPTIONS LARGER THAN GENERALLY BELIEVED.

Contrary to some opinion that 50 per cent of all prescriptions call for proprietaries or specialties, our analysis of approximately 24,000 prescriptions shows that only 25 per cent called for manufactured specialties alone, while 50 per cent called for official ingredients, that is, drugs or preparations listed in the United States Pharmacopœia or the National Formulary, and the remaining 25 per cent called for a combination of official and specialty drugs or preparations. For the narcotic prescriptions the official average was even greater, accounting for 58 per cent, specialties only two per cent and mixed 40 per cent.

FREQUENCY OF INGREDIENTS USED IN PRESCRIPTIONS.

The study of the frequency of ingredients occurring in the prescriptions will perhaps prove the outstanding piece of information brought out by the prescription study. . This material will be placed at the disposal of the United States Pharmacopœia and National Formulary Revision Committees. This subject is considered of most vital importance to all branches of pharmacy, as the manufacturer and the wholesaler are very concerned in any economic loss which is suffered by retailers and for that matter wholesalers, due to the excessive cost of handling the innumerable slow moving prescription items.

The result of the frequency of ingredient study for 8 of the 15 prescription departments being studied is partially complete. A total of 15,063 prescriptions were studied, and the number of different ingredients used in filling these prescriptions numbered 1746. Average figures for the 8 stores show that 608 different ingredients, would be required to fill 1883 prescriptions. Of the 608 ingredients, only 92 or 15 per cent occurred more than 10 times. The remaining order of occurrence was as follows: 241 ingredients had an occurrence of only one; 93 occurred only twice, 53 occurred only three times, 38 occurred four times, 22 occurred five times, 19 occurred six times, 17 occurred seven times, 14 occurred eight times, 9 occurred nine times, 10 occurred ten times.

LEADING INGREDIENTS OCCURRING OVER TEN TIMES IN ANY ONE STORE USED IN COMPOUNDING PRESCRIPTIONS.

It was previously stated that the ingredients occurring more than ten times numbered only 92. However, these were average figures. Actually when compiling and assembling these ingredients for each store we find that we have 234 different ingredients occurring over ten times in the 15,063 prescriptions studied in all the eight stores. It would naturally be expected that the variety in items stocked would increase with the number of prescriptions filled, or business done. However, the ratio of two and one-half times seems outstandingly high compared with a proportionate increase in other departments of the drug business or for that matter almost any other business. The 234 ingredients were divided as follows: Chemicals 81 or 35.0 per cent, galenicals and miscellaneous 82 or 35.0 per cent, and proprietaries 71 or 30.0 per cent.

A number of the leading chemicals and galenicals in order of their importance with the number of times they occurred in 15,063 prescriptions were as follows: Distilled water 1466, acetylsalicylic acid 992, codeine sulphate 858, acetphenetidin 908, sodium bromide 628, sodium bicarbonate 567, sodium salicylate 559, caffeine citrate 534, sodium benzoate 490, phenol 580, ammonium chloride 427, glycerin 407, elixir digestive compound 372, potassium iodide 350, tincture of nux vomica 310, peppermint water 309, syrup of wild cherry 307, codeine phosphate 301, milk of magnesia 296, phenolphthalein 296, caffeine 294, elixir of lactated pepsin 269, tincture of belladonna 266, acid boric 263, bismuth subnitrate 238, syrup of tolu 229, simple syrup 204, tincture of digitalis 203, milk sugar 199, salol 194, potassium citrate 190.

The 82 leading ingredients among the 239 items prescribed over ten times, included 62 chemicals and galenicals, the bulk of which were official, that is, U. S. P. or N. F., the remaining 20 items were proprietaries.

MODEL PRESCRIPTION DEPARTMENT.

It is hoped that something more concrete will come out of the professional phase of the survey than just a few printed reports. Pharmaceutical and chemical manufacturers as well as wholesale druggists, have suggested that a tentative plan be drawn of a model prescription department for the usual commercial type pharmacy, the stock to be based on the ingredient study of the ingredients occurring in the approximate 24,000 prescriptions studied in the 13 commercial type stores. Leaders of pharmacy have expressed great interest and, providing satisfactory arrangement can be made, have offered space to set up this hypothetical prescription department.

No attempt at this will be made to outline the benefit that would accrue to professional pharmacy, if this plan can be successfully carried out. However, it must be only too apparent. Needless to say it would among other things show the investment required, the respective cost of chemicals, galenicals, proprietaries, etc. It would furnish the basic material around which could be planned the most efficient and convenient arrangement of the prescription stock and the space required for its placement. The stock arrangement would of course be based on the frequency with which the ingredients occurred in the study. Those occurring the most would be placed most convenient to the prescription counter. The space for equipment and containers would be allocated according to the form shown in the 24,000 prescriptions studied.

Among other uses it would serve as an indicator for the pharmacist giving his opening order of prescription stock and equipment. The novice proprietor frequently over-buys on his opening order of prescription department stock and equipment.

It is also desirable that the execution of the plan would solve the problem of separating from the prescription room the following: Clerical and bookkeeping activities, unpacking and checking incoming goods and the storage of soda fountain syrups, fruits and bottle beverages, as well as the manufacture of salads, sandwiches and other fountain foodstuffs.

It is extremely difficult for a pharmacist to win the confidence of a physician and build up a profitable doctor-pharmacist relationship, if the prescription room resembles a composite warehouse, kitchen and untidy office rather than a laboratory where he fills prescriptions, and carries on other activities requiring professional skill and knowledge.

PRESCRIPTION DISTRIBUTION AMONG PHYSICIANS.

Some information regarding the extent that the prescriptions studied were divided among different physicians is available for 7 of the stores. For example, out of 2000 prescriptions studied in one store, three doctors contributed 78 per cent. The maximum for which any one doctor was responsible in any one store among 6 others for which figures are available was 40 per cent, 26 per cent, 20 per cent, 18 per cent, 13 per cent and 12 per cent, respectively.

Physician's prescriptions are very important. One can readily realize that in those stores where the prescription sales represent a substantial portion of total sales and where a few physicians contribute the bulk of prescriptions filled, the store might have to close its doors, if one or two of these physicians should cease to practice or move to another location.

Form.—We find that of the 23,963 new prescriptions analyzed, 61 per cent were liquid. Capsule prescriptions accounted for 17.5 per cent; tablets accounted for about 10 per cent; ointments approximately 4 per cent; divided powders, 3 per cent; bulk powder, 1.7 per cent; pills numbered about 1 per cent; effervescent salts about 1.4 per cent; suppositories together with lozenges, ampuls and other forms accounted for the remainder, or four-tenths of one per cent.

Size of Capsule Not Indicated.—The prescription analysis brings many interesting angles of prescription filling to light, for example, the capsule count revealed that the pharmacist only indicated the size of the empty capsule used in 1157 out of 4197 capsule prescriptions or an average for all stores of 27.6 per cent. The metric system was employed in writing 7.65 per cent of the approximately 2400 prescriptions analyzed.

LEGIBILITY OF PRESCRIPTIONS.

The pharmacist proprietor is not only liable for the accuracy of these prescriptions that he himself fills, but is likewise liable for any error on the part of his employees registered or otherwise. The prescription analyses show that the handwriting was good in 20.9 per cent, fair in 76.0 per cent and poor or illegible in 3.1 per cent of the prescriptions studied. This fact proves every owner or manager should check the accuracy of himself and all his clerks in filling prescriptions.

PRESCRIPTION INGREDIENTS.

The 23,963 prescriptions analyzed averaged approximately 2.5 ingredients per prescription. The non-narcotic prescriptions averaged 2.4 ingredients each, and the narcotic prescriptions averaged 3.2 ingredients each. This study further brought out that prescriptions with two or more ingredients accounted for approximately 64 per cent of the number studied. The popular impression that more prescriptions are filled in the winter than in the summer is confirmed in the prescription analysis. Out of an average of 3560 new prescriptions filled annually for thirteen stores, approximately 50 per cent are filled in the five months' period—December to April, inclusive. February is the peak month and accounts for twelve per cent of the total.

Over ninety per cent of 300 country druggists in Missouri and Illinois stated that they were filling approximately one prescription a day, or so few, that their prescription business was negligible and attributed it largely to the fact that the physicians did their own dispensing.

PROFESSIONAL WINDOW DISPLAYS.

Preliminary results of the survey traffic check or study would seem to indicate that only a small percentage of passersby are looking at drug store windows. Perhaps the remedy is to have fewer of the stereotype windows that are seen so frequently these days and substitute some educational or professional window displays that will not only impress the customers, but secure the good-will and coöperation of physicians as well.

Remember that in the last two to fifteen years, articles that you used to consider exclusively yours are to-day being sold in five and ten cent stores, beauty shops, department and other kinds of stores. However, prescriptions, biologicals and certain other scientific products may still be said to be the prerogative of the pharmacist. In addition to having an occasional

professional window, resurrect that old symbol of pharmacy—the show globe, or the gilded mortar and pestle or both—and display prominently.

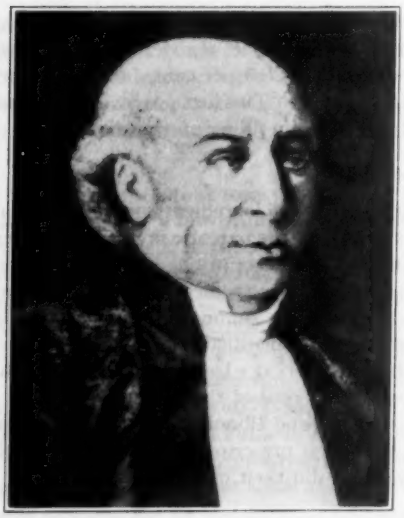
APPLYING THE FACTS.

Little attempt has been made to illustrate the value of all the facts presented, but the efficacy of facts is undisputed. An illustration of the practical application of the information being evolved from the study of the prescription departments is the following:

A large manufacturer of bottles and other glass ware recently offered a deal whereby with every order of ten or more cases of prescription ware, a set of three double scale graduates would be given free. Based on the fact brought out in our analysis of form that 61 per cent of all prescriptions studied were liquid prescriptions, and occurred in the following order—4 ounces, 27.50 per cent; 3 ounces, 22 per cent; 2 ounces, 14 per cent; 1 ounce, 12 per cent; 6 ounces, 11.50 per cent; ½ ounce, 5.50 per cent; 8 ounces, 3 per cent; and all other sizes including 12, 16 and ¼ ounce, 4.50 per cent; it was not only possible to state that ten of the thirteen stores studied could have used one or more of these deals in a year's time or less, but it was also possible to state the number of each size required.

CONCLUSION.

The facts related are only a few that have been ascertained as a result of the prescription phase of the National Drug Store Survey and it is hoped that they along with other information, contained in the first prescription report will serve to demonstrate that the income from strictly pharmaceutical operations is not only greater than is generally believed, but is capable of expansion. It is believed that this report will be available for distribution on or about April 25, 1932.



Left, Joseph Bienaime Caventou, right, Joseph Pelletier—French pharmacists—discoverers of Quinine in 1820.

"There can be coöperation only when the physician and the pharmacist feel that they are co-workers in the fight against disease, when each respects the other's special knowledge and qualifications, when mutual exchange of views will produce the satisfactory remedy for a particular patient upon whom both the physician and pharmacist are, at the moment, concentrating their attention."—H. V. A.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

ARTICLE III of Chapter VII reads: "The objects and aims of local branches of this Association shall be the same as set forth in ARTICLE I of the Constitution of this body, *and the acts of local branches shall in no way commit or bind this Association, and can only serve as recommendations to it.* And no local branch shall enact any article of Constitution or By-Law to conflict with the Constitution or By-Laws of this Association."

ARTICLE IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meeting of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten with wide spaces between the lines. Care should be taken to give proper names correctly and manuscript should be signed by the reporter.

BALTIMORE.

The March meeting of the Baltimore Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held at the Emerson Hotel on Thursday, March 17th, President Thompson presiding.

Chairman Anton Hogstad, Jr., of the Pharmacy Week Committee, presented an illustrated lecture, in the first portion of which he elaborated upon "The Changing Order of American Pharmacy," and in the second portion upon "The Romance of Cinchona."

Dr. Hogstad demonstrated what could be done in the way of creating and conducting a professional pharmacy when one proceeds along scientific lines. Before opening the pharmacy, which he developed, every detail that was conducive to efficiency of operation, convenience of patient and physician, and to a general professional atmosphere was carefully investigated. The place was kept spotlessly clean. Floors, walls and counters were immaculate. Every pharmacist was given his own working compartment and required only to fill prescriptions. Labeling and wrapping was done by people employed for that particular purpose. Dirty glassware and apparatus were removed immediately and cleaned in another part of the building. Direct telephone connections were established with the offices of many physicians; prompt motor delivery insured immediate service. A large and modern reference library was maintained for the convenience of pharmacist and physician alike. Visitors were welcomed and permitted to view, in person, the character of the establishment wherein their prescriptions were compounded.

The net result of this effort has been the establishment of firm bonds of confidence with both physician and patient, and substantial increase in their opinion of professional pharmacy. Incidentally the prescription business of this establishment has increased from a score to over five hundred daily.

Dr. H. C. Christensen, Secretary of the National Association of Boards of Pharmacy, was present and gave a short talk on the Pharmacy Exhibit that will be displayed at the Chicago World's Fair in 1933.

Upon the motion of E. G. Eberle, seconded by the secretary, Dr. Hogstad was elected to honorary membership, and on the motion of Dr. Kelly, seconded by Mr. Jackson, Dr. Christiansen was elected to honorary membership in the Baltimore Branch.

Dr. Glenn L. Jenkins of the University of Maryland made a brief report upon the recent joint sectional meeting of the American Association of Colleges of Pharmacy and the National Association of Boards of Pharmacy held in New York.

A vote of thanks was accorded to Dr. Stevens, for his kind assistance in furnishing and operating a lantern for this occasion.

WM. F. REINDOLLAR, *Secretary-Treasurer.*

CHICAGO.

The 204th meeting of the Chicago Branch of the AMERICAN PHARMACEUTICAL ASSOCIA-

TION was held Tuesday evening, March 15th, at the University of Illinois School of Pharmacy. President Terry opened the meeting and introduced Dr. Joel B. Peterson, chemist of the American Medical Association Chemical Laboratory.

Dr. Peterson discussed "The Examination of Medicinals." He said that the American Medical Association has been examining medicinals for twenty-five years.

The work naturally divides itself into two divisions:

(1) Drug standards.

(2) Methods of analysis for certain products difficult of analysis.

The American Medical Association aims to set standards for drugs and preparations not official. Drug standards are needed first, to assure physician and patient that the medicines being prescribed are of definite, known strength, and second, that the patient does not receive impurities in the medicine that are harmful.

An example was cited wherein a gelatin capsule preparation was being marketed which contained bichloride of mercury dissolved in an oil. On analysis, this preparation did not show the strength of the mercury that was claimed. This was reported to the manufacturers, who were unable to account for the loss of strength. The Chemical Laboratory of the A. M. A. finally discovered that the mercury was reacting with the gelatin of the capsule. The preparation was withdrawn from the market because of uncertain strength.

Ephedrine was standardized in the A. M. A. Laboratory at the beginning of its rise in popularity. Large manufacturers standardized their ephedrine preparations according to the A. M. A. standard and this led to uniform standards for ephedrine throughout the country.

The A. M. A. Laboratory has aimed to get the very best preparations possible with as little inconvenience as possible to the manufacturer, contingent with preparations free from harmful ingredients.

The standards for ephedrine were then discussed and the identifying tests for this drug were shown. An unusual occurrence was discovered by the A. M. A. Laboratories in that the ephedrine base reacted with pure chloroform to form the chloride of ephedrine.

Trichloroethylene was mentioned as a drug needing definite standards for purity as it may have many impurities present.

The methods of analysis used for some of the popular antiseptics were shown.

Following the discussion a rising vote of thanks was extended to Dr. Peterson.

LAWRENCE TEMPLETON, *Secretary.*

DETROIT.

The March meeting of the Detroit Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held in the Y. M. C. A. Building, Thursday, March 24th. The meeting was preceded by a beefsteak dinner. Owing to the small attendance the minutes of the February meeting were not read.

President Liddell introduced the speaker of the evening, L. A. Danse, chief metallurgist of the Cadillac Motor Car Co., whose subject was "The Progress of Metallurgy." Of particular interest to pharmacists is the large part magnesia plays in the present-day construction of automobiles. He stated that in using magnesia it is possible to obtain a much lighter, more flexible and elastic metal, which is necessary in the modern automobile. The speaker referred to magnesia as the liquid metal, as 50,000 tons a day of this brine are pumped from the Dow Chemical Co. plant at Midland.

"A most startling fact," Mr. Danse said, "is that the present-day highly efficient brake is responsible for the speed of the modern motor car." He said that, for many years, motors had been capable of developing high power and speed but it was not safe to fully utilize this speed. Then brakes were developed to stop a motor car at a safe distance, when required. An interesting statement, aside from metallurgy, as mentioned by Mr. Danse, was that there are forty different compositions of rubber used in the manufacture of the present-day automobile.

A discussion followed, lead by Dean Edward H. Kraus, of the University of Michigan, and Fred Ingram, Jr., regarding the progress made in obtaining some of the newer metals. On Mr. Ingram's motion a rising vote of thanks was given the speaker.

BERNARD A. BIALK, *Secretary.*

NORTHERN OHIO—WESTERN RESERVE.

The second regular meeting of the Academy of Pharmacy and the Northern Ohio Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held on March 11th in the lecture

room of the School of Pharmacy. The meeting was preceded by the usual council dinner meeting.

Professor Davy introduced the speaker, Dr. J. R. Driver, to the society. Dr. Driver addressed the Academy on the Relationship between the Physician and the Pharmacist.

"It is well known," Dr. Driver said, "that the average physician, especially if he has not been practicing long, is lacking in knowledge of the compounding of drugs. Your society can do him a great service in helping his mistakes."

Dr. Driver presented the following points on what the physician expects of his pharmacist. One of the first things the physician wishes to know is whether the pharmacist carries the best drugs obtainable and whether his stock is well controlled. A physician's reputation depends to a great extent upon his prescriptions. The physician will be interested to know if the stock is complete and if supplied from makers known for their high standards, and if there are proper safeguards against deterioration, and how biologicals are taken care of. When he finds these questions answered satisfactorily he does not hesitate to send his patients there.

The physician is interested in the store equipment. He wants it to have a certain amount of professional dignity, he wishes the patient to feel that the major interests are professional, not merchandising. A clean, neat, orderly prescription department goes far toward establishing confidence. "I believe," said Dr. Driver, "that patients as well as physicians will eventually support the professional pharmacy—no other store gives such a high type of service."

Next, the physician is interested in the personnel of the drug stores. He wants to know what preparation the pharmacists have had for the profession. It is important for the pharmacist as well as for the physician to continue to be interested in studying and keeping up-to-date in the development of his profession. One of the pharmacist's most important duties is to prevent mistakes. The pharmacist's knowledge of chemical reactions, incompatibilities, etc., will enable him to detect a mistake, if one occurs. He must be loyal to the physician, protect him and not destroy the patient's confidence in him.

In closing, Dr. Driver emphasized the need for a better understanding between physicians and pharmacists.

The paper was discussed by the members and a rising vote of thanks was given Dr. Driver for his interesting and instructive paper.

F. J. BACON, *Secretary.*

NEW YORK.

The 25th Anniversary of the founding of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was celebrated on March 14th by a dinner in honor of the Delegates of the National Association of Boards of Pharmacy and of the American Association of Colleges of Pharmacy of District No. 2; the dinner, which was supported by the Brooklyn, Fordham, New York and St. John's Colleges of Pharmacy, was held in the South East Ballroom of the Hotel Pennsylvania. The guests numbered one hundred and ten and included President-Elect Bruce Philip of the A. PH. A., Secretary E. F. Kelly of the A. PH. A., A. L. I. Winne, *President* of the N. A. B. P. and H. C. Christensen, *Secretary* of the N. A. B. P.

Dr. Hugo H. Schaefer acted as toastmaster, who, after welcoming the visitors, briefly reviewed the history of the New York Branch in the following words: "In 1907, largely owing to the fact that the A. PH. A. was to meet in New York City the following year, a lively interest was voiced in this organization and a call was issued signed by Thomas P. Cook, Gustave Ramsperger, Jacob Diner, William C. Anderson, Ewen McIntyre, William J. Schieffelin, Oscar C. Kleine and Caswell A. Mayo, suggesting that a Branch be organized. This was effected at a meeting held in the New York College of Pharmacy on March 16, 1907. At that meeting Thos. P. Cook acted as temporary chairman and E. J. Kennedy as temporary secretary. The actual motion to organize was made by Jacob Diner. A nomination committee was at once appointed and consisted of Messrs. Hitchcock, Gallagher, McIntyre, Roehrig and Stone. As a result the first officers elected were: *President*, William C. Alpers; *Vice-President*, William J. Schieffelin; *Secretary*, Caswell A. Mayo; *Treasurer*, Joseph Weinstein; *Chairman of Membership*, George C. Diekman; *Chairman on Science and Practice of Pharmacy*, H. L. Lohmann; *Chairman on Professional Relations*, William C. Anderson; *Chairman on Education and Legislation*, Thomas F. Main. Since then, for 25 years, the Branch has held its meetings—eight per year without a single lapse. I believe this establishes a record for

A. PH. A. Branches. We have been hosts to the parent organization at its annual meetings on two occasions. The Remington Medal, an annual award for service to pharmacy has been established by our Branch and two of its own active members have been singled out as recipients of this medal. Three of our Branch members are past-presidents of the parent organization and many others have held important offices in the organization. And I need not only draw upon the past in outlining our activities and accomplishments, for during the entire 25 years of existence our Branch has never been more flourishing than at present. During the past two years the attendance at our monthly meetings has never been below 65, and our membership consists of about 225 active members and 250 student members."

Dr. Schaefer then introduced, as the first speaker, Professor Hugh C. Muldoon, Chairman of the Colleges of Pharmacy of District No. 2, and Dean of the College of Pharmacy of Duquesne University.

The address of Dean H. C. Muldoon was entitled "Pharmacy in Retrospect;" it precedes the Department of Local Branches.

The toastmaster next called upon Dr. Robert P. Fischelis, President of the New York Branch of the A. PH. A., and *Vice-President* of the N. A. B. P. and *Chairman* of the Boards of Pharmacy of District No. 2; Dr. Fischelis delivered an address on "Pharmacy in Prospect;" it precedes the Department of Local Branches.

After the close of the address, Chairman Schaefer said that the remainder of the evening would be taken by a vaudeville entertainment, featuring R-K-O Radio artists; this had been made possible through the courtesy of the *American Druggist* and its *Editor*, Mr. Herbert R. Mayes, to whom he wished to express the thanks of all.

This celebration of the Branch's 25th Anniversary proved to be a most enjoyable affair.

HERBERT C. KASSNER, *Secretary.*

PITTSBURGH.

The meeting of the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held Tuesday evening, February 16th, at the Pittsburgh College of Pharmacy; Dr. John Wurdack presided. The minutes of the January meeting were read by acting secretary, C. T. Van Meter, and approved. Communications from the Central Office were read. The president presented Professor Saalbach who is vice-chairman of the Revision Committee of the National Formulary. Dr. Saalbach elected to tell of the routine and detail that is involved in executing this responsible position. He then presented for consideration several specific problems that confront the Committee. Among these was the matter of scope of the new National Formulary; a consideration of the new official Liquor Antisepticus; Ointments and Ointment Bases; Petroxolins and Elixirs. Dr. Saalbach concluded his program by answering questions and directing discussion about this subject which is of paramount importance and great concern to every member of the Pittsburgh Branch, since the AMERICAN PHARMACEUTICAL ASSOCIATION is responsible for the editing and publication of this authoritative standard.

The Pittsburgh Branch is honored in having one elected from its number serving in this important capacity. Thanks and appreciation were extended to the speaker by the president. Announcements were made by President Wurdack and indication to the effect that the next meeting would be held March 22, 1932.

MARCH.

The regular monthly meeting of the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held Tuesday evening, March 22nd, at the Pittsburgh College of Pharmacy. Prof. John S. Wurdack presided. The minutes of the February meeting were read and approved. A communication from the Central Office was read and considered by the group. It was unusually significant in the fact that *not* a single resignation from the parent organization was reported.

The younger pharmacists and members of the Pittsburgh Branch are displaying great interest in the proceedings and activities of association work. Among those present at this meeting were many members of the Student Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, affiliated with the Pittsburgh College of Pharmacy.

President Wurdack presented to the Society the speaker of the evening, Prof. Edward C. Reif, member of the staff of the Pittsburgh College of Pharmacy. He presented for the thoughtful consideration of the group the subject: "Glands and Glandular Products in

Modern Pharmacy." Dr. Reif considered facts which were of utmost importance to pharmacists. The preparation and preservation of Glandular Substances was thoroughly considered. A point that the speaker emphasized was the fact that these glandular preparations should never be promiscuously sold to the laity and should only be used under the strict order of the physician. Professor Reif concluded his program by directing discussion and answering questions. A rising vote of thanks was ordered and extended to the speaker of the evening. Sixty members were in attendance. Announcement was made that a joint meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION and the Students' Branch, A. PH. A., of the Pittsburgh College of Pharmacy would be held some time in the month of April.

FRANK S. MCGINNIS, *Secretary.*

OFFICERS.

The following officers were elected to serve for the present term of the Pittsburgh Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION:

President, J. H. Wurdack.
Vice-President, C. T. Van Meter.
Secretary-Treasurer, Frank S. McGinnis.
Delegate to House of Delegates, C. Leonard O'Connell.

OFFICERS OF STUDENTS' BRANCH.

The following officers were elected to serve the Pittsburgh College of Pharmacy Students' Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION for the coming term:

President, Robert P. Moore.
Vice-President, John Theil.
Secretary, Sidney Zalevsky.
Treasurer, Morley Itscoitz.

PHILADELPHIA.

The March meeting of the Philadelphia Branch, AMERICAN PHARMACEUTICAL ASSOCIATION was held at the Philadelphia College of Pharmacy and Science, on Tuesday evening, March 8, 1932. President Munch called the meeting to order at 8:30.

The minutes of the February meeting were read and approved. This was followed by the secretary's report, which included a résumé of what had been accomplished during the past year, as well as an analysis of the current membership and their financial standing. This report was favorably received. The treasurer's report was submitted with a certificate of audit as rendered by E. H. MacLaughlin. The report showed a balance of $225.82 in the checking account. A motion to accept this report was made and passed.

On the invitation of President Munch, Dr. John C. Krantz, Jr., discussed research work on Digitalis concerning the relationship of p_H value to heart tonic action of tinctures prepared with different strengths of alcohol. Much interest was shown in the discussion which followed, when Dr. Krantz was interrogated by Messrs. Harrison, Barol, Hendrickson, Nichols and Hogstad. Citing the interest shown by Dr. Krantz in the local branch, Mr. MacLaughlin proposed him for Honorary Membership. This motion was favorably received and Dr. Krantz was presented with his membership card.

The official speaker of the evening, Anton Hogstad, Jr., was presented and immediately launched an interesting, illustrated lecture on the "Romance of Cinchona." His excellent oratory rapidly guided us through three hundred years of the terrific struggle waged by Quinine against the Malarial Parasite. Appropriate lantern slides represented the outstanding features of the lecture, due credit being given the workers who spent their lives conquering Malarial Fever. On motion of Mr. Cliffe, a rising vote of appreciation and an Honorary Membership in the local branch, were tendered the speaker.

President Munch next expressed his appreciation for the coöperation given him during the past year and stressed the necessity for a larger attendance as a stimulus for the incoming officers.

The Committee on Nominations was called on by the president for its report. The Committee consisted of Chairman Dunn, Dr. Eby and Professor Frank. Chairman Dunn read the report as follows:

For *President*, William J. Stoneback.
First Vice-President, C. E. Vanderkleed.
Second Vice-President, George A. Slothower.
Secretary-Treasurer, Edmund H. MacLaughlin.
Delegate to A. Ph. A., Ambrose Hunsberger.

The report was accepted and as there were no further nominations Mr. Cliffe asked Chairman Dunn to cast a unanimous vote for the nominees. The ballot was cast and President Munch declared the nominees elected.

Preceding the meeting, the members assembled in the Auditorium of the College for the Annual Past-Presidents' dinner. Past-Presidents present were Mr. Cliffe, Dr. Cook, Mr. Goodhart, Dr. Harrisson, Mr. Hendrickson, Professor Nichols and Dr. Dunn, while messages of regret for inability to attend were received from Mr. Blair, Dr. Pearson, Dr. LaWall, Mr. Kimberly, Mr. Hunsberger, Mr. McNeary and Mr. Jenkins.

W. J. STONEBACK, *Secretary.*
E. H. MacLAUGHLIN, *Secretary-Elect.*

THE ACADEMY OF PHARMACY AND THE NORTHERN OHIO BRANCH OF THE A. PH. A.

Bulletin No. 7 of these organizations, deals with ephedrine-studies that have been made of the decomposition and the best means of protection. The *Bulletin* refers to the articles in the JOURNAL OF THE A. PH. A., in 1926. These *Bulletins* are intended for physicians and, doubtless, are a great help; they are reminded that the pharmacists of the Academy can prepare solutions of ephedrine in oil, and explanation is also made of what is termed a "simple oil solution" and "a compound solution in oil." References are also made to the "New and Nonofficial Remedies" and "Merck's Index" in this connection.

Bulletin No. 8 deals with the preparation of iron medication. A number of interesting combinations are suggested to the physician and also suggestions for improving the keeping qualities of these prescriptions.

Education is leading human souls to what is best, and making what is best out of them; and these two objects are always obtainable together and by the same means. The training which makes men best in themselves also makes them most serviceable to others.—JOHN RUSKIN.

RESOLUTIONS OF THE BOARDS AND COLLEGES, DISTRICT NO. 2.

(NEW YORK CITY.)

1. *RESOLVED*, That these conferences be continued as there has been ample proof both of their need and their constructive value.

2. *That* this organization request a speedy completion of the "Syllabus" and that we direct the *Secretary* of this Conference to make our desire known to the proper authorities.

3. *That* the suggested guide for preparing examinations in pharmaceutical chemistry as developed originally in a paper by L. L. Walton of Pennsylvania and so ably discussed and amplified in the paper by Dr. Glenn L. Jenkins of Maryland, be again endorsed and brought specifically to the attention of the members of Boards of Pharmacy in District No. 2.

4. *That* the Secretary of this Conference be instructed to send to each one of the State Boards of Pharmacy of District No. 2 the list of important drugs approved by this Conference, asking the State Boards whether they are willing to limit their questions on materia medica to those drugs named on the list; and that the Secretary shall communicate to the next meeting of this Conference a list of those State Boards which have agreed so to limit their examinations.

5. *That* the findings of the Committee on Materia Medica of District No. 2 be transmitted to the National Conference with the recommendation that they be adopted as the National standard for materia medica examinations.

6. *That* the members of the Conference of District No. 2 endorse the issuance of the Bulletins of the Department of Education of the N. A. B. P. They are of very great value both to board members and faculty members and they should be continued.

7. *That* pharmaceutical arithmetic should constitute a separate subject for state board examinations and the results should be used in computing the passing averages of applicants.

Resolutions were drawn up in memory of the deaths of Charles F. Kramer and of A. Percival Hohness. Telegrams of sympathy were sent to Dr. L. L. Walton and Dean Willis G. Gregory, both of whom were prevented by illness from attending the Conference.

It was voted to continue the plan of three joint sessions of the Boards and Colleges rather than to have any separate meetings of the two groups. Provision was made for defraying the expense of publication of the minutes of the meetings of the Conference, and, the New York Branch of the A. PH. A., the Colleges of Pharmacy of Greater New York and the *American Druggist* were thanked for their hospitality.

The next meeting will be held in Philadelphia, March 13 and 14, 1933.

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1931–1932.

Office of the Secretary, 10 West Chase Street, Baltimore, Md.

LETTER NO. 9.

April 2, 1932.

To the Members of the Council:

76. Expenses of N. F. Subcommittee. Motion No. 25 (see Council Letter No. 8, page 170) has been carried and Chairman Gathercoal advised.

77. Election of Members. Motion No. 26 (see Council Letter No. 8, page 171) has been carried and applicants numbered 192 to 213, inclusive, are declared elected.

78. Use of Text of N. F. V. Prof. J. W. Millar submitted a request to use portions of the text of the National Formulary in the preparation of his book on "Pharmaceutical Assaying" of the U. S. P. and N. F., and samples of the proposed text. It was suggested to Professor Millar that the extent of quotation would be substantial reproduction and that the cost would be in proportion. Professor Millar has modified the extent of use, and the following communication has been received from Chairman DuMez of the Committee on Publications:

> "In view of the modifications in the manner in which the text of the National Formulary is to be used by Prof. J. W. Millar, it is recommended that he be granted permission to use portions of the text of the N. F. in the preparation of his book on the 'Pharmaceutical Assaying' of the U. S. Pharmacopœia and of the National Formulary, and that the regular fee of $5.00 be charged."

(*Motion No. 27*) *It is moved by DuMez that Professor J. W. Millar be given permission to use the text of the N. F. V for partial reproduction in the preparation of a book on "Pharmaceutical Assaying" of the U. S. P. and N. F., and at the usual charge of $5.00.* (Voting card enclosed.)

79. Membership in Inter-Society Color Council. Following the exhibit at the U. S. P. Convention of 1930 and the conference on color standardization held at that time, efforts have been continued, in which the A. PH. A. has coöperated, to form a permanent organization of the associations and societies interested in the problems associated with color.

At a meeting in New York City on December 29, 1931, the Inter-Society Color Council was formed and the ASSOCIATION is invited to become a Charter Member. The ASSOCIATION was represented at the meeting by Drs. H. V. Arny and J. L. Lascoff both of whom approve accepting the invitation. The following quotations are from the Articles of Organization and Procedure:

> "ARTICLE II—*Aims and Purposes.*—The aims and purposes are to stimulate and coordinate the work being done by the various societies and associations leading to the standardization, description and specification of color, and to promote the practical application of these results to the color problems arising in science, art and industry."
>
> "ARTICLE III—*Membership.*—The members shall be national societies and associations interested in color and operating on a non-profit basis. Each member shall be entitled to representation at all meetings of the Council by one or more accredited delegates. Each delegation is entitled to one vote which shall be cast by one of its members who shall be designated as the voting delegate."
>
> "ARTICLE VII—*Membership Dues.*—The membership dues shall be twenty-five dollars ($25.00) a year. These membership dues may be waived by the Executive Committee."

Dr. E. N. Gathercoal was elected Chairman of the Council.

The expenditure for membership was referred to the Committee on Finance and was approved.

(*Motion No. 28*) *It is moved by Bradley that the A. PH. A. become a Charter Member of the Inter-Society Color Council and that an appropriation of $25 be added to the budget for 1932 to cover the annual dues.*

80. Applicants for Membership. The following applications properly endorsed and

accompanied by the first year's dues have been received:

No. 214, Horace M. Carter, 115 West 68th St., New York, N. Y.; No. 215, P. Cusick, 13416 Detroit Ave., Cleveland, Ohio; No. 216, Emmet J. Doyle, 1 Lincoln Ave., Newark, N. J.; No. 217, M. F. W. Dunker, 5511 Sefton Ave., Baltimore, Md.; No. 218, Ben. C. Dysart, 908 South Garden, Columbia, Tenn.; No. 219, Emil L. Emeis, 2124 Grand Ave., Des Moines, Iowa; No. 220, Nicholas W. Fenney, 570 Elm St., New Haven, Conn.; No. 221, V. T. Fulco, 335 Niagara St., Buffalo, N. Y.; No. 222, Edward Gassler, 1325 E. 19th St., Brooklyn, N. Y.; No. 223, Otto A. Hanson, 414 Ashland Ave., River Forest, Ill.; No. 224, Fred W. Lamont, Iota Ct., Madison, Wis.; No. 225, Earl L. McFetridge, 3481 Fairmount Blvd., Cleveland, Ohio; No. 226, Esther Meyer, 7941 Dobson Ave., Chicago, Ill.; No. 227, Albert C. Moreau, 114 E. Clinton Ave., Oaklyn, N. J.; No. 228, Joseph Paradowsky, 800 Minnesota St., Kansas City, Kans.; No. 229, C. W. Peppernau, Prepp's Pharmacy, Kent, Wash.; No. 230, E. Remy, 7410 Wade Park, Cleveland, Ohio; No. 231, Sister Edith, 1833 Main St., Buffalo, N. Y.; No. 232, Sister Lucia Bourbon, St. Vincent's Hospital, Norfolk, Va.; No. 233, Sister Serena, Providence Hospital, Washington, D. C.; No. 234, Sylvia Lois Velinsky, 2922 Ulman Ave., Baltimore, Md.; No. 235, Edward N. Watts, 1632 Howarth St., Philadelphia, Pa.; No. 236, Grace Youngberg, 1157 Crystal Ave., Salt Lake City, Utah; No. 237, Sam Zalevsky, 243 East Third Ave., Homestead, Pa.; No. 238, Bernard W. Zlinhoff, 233 W. 112th St., New York, N. Y.; No. 239, Ciriaco Angcao, Box 66, Pullman, Wash. (Asso.); No. 240, James John Bacos, 21 Gold St., Lowell, Mass.; No. 241, George Bizen, 279 Bellview St., Benton Harbor, Mich.; No. 242, William S. Brinsfield, Chestertown, Md.; No. 243, Harry H. Buch, 135 State St., Harrisburg, Pa.; No. 244, V. P. Burrington, College Station, Brookings, S. Dak. (Asso.); No. 245, Lee W. Cagle, Box 35, College Station, Pullman, Wash. (Asso.); No. 246, Perry J. Callaghan, 621 Hanover St., Manchester, N. H.; No. 247, Harry N. Charkoudian, 3316 Main St., Springfield, Mass.; No. 248, V. E. Christilaw, 483 King St., East Hamilton, Ont., Can.; No. 249, S. Lenwood T. Clifford, Dalhousie, N. B., Canada; No. 250, William E. Contes, 3436 Ward, Apt. 6, Pittsburgh, Pa.; No. 251, Kermit Decker, 1807 Monroe St., Pullman, Wash. (Asso.); No. 252, Theron Duerfeldt, 608 California St., Pullman, Wash. (Asso.); No. 253, Peter Feciura, 5100 W. Grand Ave., Chicago, Ill.; No. 254, Samuel W. Goldstein, School of Pharmacy, University of Maryland, Baltimore, Md.; No. 255, Nathan Greenberg, 2706 1st Ave., Cedar Rapids, Iowa; No. 256, Burel Greer, 102 Whitman St., Pullman, Wash. (Asso.); No. 257, Paul M. Hilliard, Box 96, Leslie, Mich.; No. 258, Chas. J. Kelly, 5116 Magazine St., New Orleans, La.; No. 259, John E. Kramer, 3336 Tilden St., Philadelphia, Pa.; No. 260, Robert Matson, 619 Main St., Brookings, S. Dak. (Asso.); No. 261, Raymond S. McCullough, Cass City, Mich.; No. 262, Irving Miller, 1200 Maiden Lane, Pullman, Wash. (Asso.); No. 263, Florence Ness, College Station, Box 524, Pullman, Wash. (Asso.); No. 264, Lillian C. Preston, 413 S. Stewart St., Big Rapids, Mich.; No. 265, Jose Sulit, Box 42, College Station, Pullman, Wash. (Asso.); No. 266, Ethel E. Taylor, Grayling, Mich.; No. 267, Max Techow, Huexter 4, Hamburg 8, Germany; No. 268, Jack E. Tenny, Fennville, Mich.; No. 269, Frank Theis, 320 8th St., Ames, Iowa; No. 270, Gus. Waarala, 115 New Street, Demmon, Mich.; No. 271, Virginia Wall, 1703 Ruby St., Pullman, Wash. (Asso.); No. 272, John Francis Weber, Box 397, College Sts., Pullman, Wash. (Asso.); No. 273, Theodore A. Young, 2376 Ferris Ave., Detroit, Mich.; No. 274, N. A. Qazilbash, Islamia College, Peshawar, India; No. 275, Sidney Manuel Zalevsky, 243 Third Ave., Homestead, Pa.

(*Motion No. 29*) *Vote on applications for membership in the American Pharmaceutical Association.*

E. F. KELLY, *Secretary.*

CALDWELL SWEET.

We regret to have had no earlier advice of the passing of our veteran member, Caldwell Sweet of Bangor, Maine, who died July 26, 1928. Tribute is paid him by the frontispiece of this issue.

CHARLES WEST PARSONS.

Just before closing the April number of the JOURNAL we are advised of the death of Charles West Parsons, of the Scientific Staff of E. R. Squibb & Sons, and former Editor of the *Practical Druggist.*

EDITORIAL NOTES

Editor: E. G. Eberle, 10 West Chase Street, Baltimore, Md.

Members of the Council, A. PH. A.: S. L. HILTON, *Chairman;* CHARLES H. LAWALL, *Vice-Chairman;* E. F. KELLY, *Secretary;* H. V. ARNY, A. G. DUMEZ, H. A. B. DUNNING, WILLIAM B. DAY, C. E. CASPARI, J. H. BEAL, W. BRUCE PHILIP, T. J. BRADLEY. *Ex-Officio Members:* WALTER D. ADAMS, *President;* J. G. BEARD, J. W. DARGAVEL, *Vice-Presidents;* C. W. HOLTON, *Treasurer;* E. G. EBERLE, *Editor of the Journal;* A. G. DUMEZ, *Editor of the Year Book;* THOMAS ROACH, *Chairman of the House of Delegates.*

Collaborators: The Members of the Council; E. FULLERTON COOK, *Chairman,* U. S. P. Revision Committee; E. N. GATHERCOAL, *Chairman,* N. F. Revision Committee; Chairmen of the Sections, A. PH. A.: L. E. WARREN, C. J. CLAYTON, W. G. CROCKETT, ROWLAND JONES, J. T. LLOYD, TOWNES R. LEIGH, *President,* A. A. C. P.; CHARLES B. JORDAN, *Chairman,* Executive Committee, A. A. C. P.; A. L. I. WINNE, *President,* N. A. B. P.; HENRY C. CHRISTENSEN, *Secretary,* N. A. B. P. Scientific Section—Board of Review on Papers: *Chairman,* GLENN L. JENKINS, Baltimore, Md.; EDWARD E. SWANSON, Indianapolis, Ind.; W. J. HUSA, Gainesville, Fla.

PRESCRIPTION PROBLEMS.

BY S. L. HILTON, PHAR.D.

OESCHNER'S SOLUTION.

What formula have you for Oeschner's Solution?

We have the following:

Phenol (liq.)	43 min.	1 oz.
Alcohol	4 ozs.	32 ozs.
Saturated Solution of Boric Acid	1 pint	0
Boric Acid	0	5 ozs.
Water to make	0	1 gallon

EPHEDRINE SOLUTION.

How may the following prescription best be prepared so as to form a clear solution, suitable for use in an atomizer:

Ephedrine Alk.
Menthol
Camphor, aa. gr. v.
Liq. Petrolatum, fl. oz. 1

What is the best method of preparing a stable 1% solution of Ephedrine in liquid petrolatum for prescription use?—March 28, 1932.

Ephedrine Alk.
Menthol
Camphor, aa. gr. v.
Liq. Petrolatum, fl. oz. 1
Misce:

(Directions should always be given.)

This prescription is one we fill frequently and the only way to do it satisfactorily and obtain a clear solution is to dissolve each constituent separately in a portion of the Liq. Petrolatum with the aid of gentle heat and then mix them.

I follow the same method in making a solution of Ephedrine in Liq. Petrolatum for prescription use.—S. L. HILTON.

A BACTERIOLOGICAL JUBILEE.

During the last month biologists and medical men celebrated the fiftieth anniversary of the discovery by Robert Koch of the tubercle bacillus. The difficulty of obtaining pure cultures with the bacteriological experience available in 1882 was formidable, as the bacillus does not thrive in most of the usual media; and it was only when Koch used solidified blood serum that he surmounted this obstacle. So important has his work proved to be in the fight against a baffling disease that it may be regarded as comparable with the researches of Pasteur and of Lister. Since his day Sir Almroth Wright and others have made brilliant contributions to the treatment of tuberculosis; an extensive scientific literature of the subject has grown up, and the precise action of "old" and "new" tuberculins is still a matter of debate. The most important fact, however, is that deaths from tuberculosis in its varied forms are steadily falling; and for this we are indebted to the pioneer work of Koch.—From *The Chemist and Druggist.*

ANTIDOTES FOR STRYCHNINE POISONING.

Dr. Howard W. Haggard and Leon A. Greenberg, Ph.B., from the Laboratory of Applied Physiology, Sheffield Scientific School, Yale

University, report on the above subject in the *Journal of the American Medical Association*, of April 2, 1932, and reached the following conclusions:

1. Magnesium sulphate does not prevent or even diminish strychnine convulsions in rats. It is not an antidote for strychnine.

2. Apomorphine controls convulsions in rats and dogs. It allows recovery after approximately twice the lethal dose of strychnine, but not when the dose is three times the lethal amount. Strychnine does not antagonize apomorphine or even diminish its toxicity for rats.

3. There are reported three cases in which the use of apomorphine was followed by recovery in human beings who had taken presumably lethal amounts of strychnine.

4. Phenobarbital sodium controls strychnine convulsions in rats and dogs. Recovery follows the administration of five times the lethal dose of strychnine.

5. A true antagonism between the actions of phenobarbital sodium and strychnine is indicated. Rats and dogs that have received amounts of phenobarbital as high as three times the lethal dose may be saved by the administration of amounts of strychnine which by themselves would be fatal.

ACETYLSALICYLIC ACID TABLETS.

An examination of several batches of old acetylsalicylic acid tablets prepared in Government laboratories at various times has been carried out by W. Knoll (*Apotheker-Zeitung*, 45, 69, 1063), who reports that nearly all of the tablets had undergone partial decomposition; most of them gave a distinct reaction for free salicylic acid, and the melting point of the isolated acetylsalicylic acid was considerably below the official figure, whereas that of acetylsalicylic acid obtained from good tablets was correct. Tablets prepared with talc and agar gave off a slightly acidulous odor when the bottles were opened after eighteen months' storage. Both kinds of tablets gave reactions for free and masked salicylic acid; in the case of the tablets containing agar and talc the violet coloration exceeded the limits allowed by D. A. B. VI., and the melting point of the acid extracted from them with ether was between 126° and 127° C. instead of 135° C.—From *The Pharmaceutical Journal and Pharmacist.*

THE ISOLATION OF CAROTENE.

H. N. Holmes and H. M. Leicester (*Journal of the American Chemical Society*, 54, 2, 716), in a study on the isolation of carotene, emphasize the value of canned carrots as a laboratory source of carotene. The first step was to crush the carrots in a Carver hydraulic hand press. The juice pressed out contained practically no carotene and was discarded. The press cake was ground up in a meat grinder and placed under 1.25 litres of acetone. After standing thus from eight to ten hours, the mixture was filtered on a Buchner funnel and the pulp pressed once more, again with a pressure of 8000 lb. per sq. in. The pulp, now a solid cake, was reground and allowed to stand for half an hour with 1.25 litres of fresh acetone. It was then filtered as before, and placed under one litre of petroleum ether. After an hour this solvent was filtered off and replaced by a litre of acetone. This also was allowed to stand for an hour, then was filtered and a final litre of petroleum ether was placed on the carrots. After another hour they were filtered and washed with 0.5 to 0.75 litre of petroleum ether. The pulp was then practically colorless, and further extraction was unnecessary. The petroleum ether was evaporated to about 75.100 cc. under reduced pressure, and then treated with a large excess of absolute alcohol, with violent stirring. A fatty substance precipitated and settled out. This was rapidly filtered off, the filtrate was placed in a flask in an atmosphere of nitrogen, and was allowed to stand for twenty-four hours in the ice-box. The carotene crystallized out in dark red lustrous crystals. From 100 gallons of canned carrots a quantity of carotene was obtained which, after standing over phosphorous pentoxide in a vacuum desiccator to remove solvent of crystallization, weighed 7.5 Gm. This is a yield of approximately 0.037 Gm. of pigment per kilogram of carrots. After four precipitations from chloroform by methyl alcohol as recommended by Olcovitch and Matill, the carotene melted at 173.6–174.6°.—*Pharm. Jour. and Pharm.*

SPINASTEROL.

Merrill C. Hart and Frederick W. Heyl (*Journal of Biological Chemistry*, 95 (1932), 311–315) have isolated from spinach a new sterol, spinasterol, which melts at 168° to 169° C., and has a specific rotatory power of —1.8° at 25° C. in sodium light. They have

prepared its esters with acetic, propionic, butyric, trichloroacetic, benzoic and para nitrobenzoic acid, and phenyl urethane. It reacts with chloroacetyl chloride to yield the derivative of a metameric compound, isospinasterol chloroacetate.

DENTAL ABSORPTION.

The great importance of a thorough knowledge of the absorption of drugs by the teeth is stressed in a report made by the Council on Dental Therapeutics of the American Dental Association.

"Dentists may not commonly attach significance to the possibilities involved here," the report begins. "Deep reflection suggests remote action of drugs resulting in unnecessary or undesirable effects on other organs, cumulative action, slow insidious poisoning of the system, altering effects on functions resulting in sensitization or allergy, effects on immunologic processes and various protective merchanisms, etc. A thorough knowledge of dental absorption might be of assistance in determining the nature and activity of dental tissue itself. The latter might be suggested from the behavior of the drugs, according to their nature and their physical and chemical properties."

The report mentions research carried on by Obiglio, an Argentinian, and Chaneles on dogs. "Previous investigators had demonstrated the absorption of potassium iodide, atropine, arsenic and chicken-cholera germs from the dental pulp. From 33 to 46 per cent of the arsenious oxide placed in pulp chamber was recovered from the urine. Negative results were reported for mercuric chloride, sodium salicylate, iodoform, strychnine, tetanus toxin and cobra venom.

"Obiglio used dogs in his researches. The animals were occasionally anesthetized with ether, but generally with chloralose, which maintains an efficient state of the blood circulation, a matter of first importance for satisfactory and critical results in studies of absorption. The teeth were drilled and the dental pulp was exposed without injury, as nearly as possible. Then the drug was placed in the tooth in dry form as a paste and the wound was covered with rubber and cement. The methods of determining absorption were unique, namely, by quantitative chemical analysis for the drug in body fluids and by typical pharmacologic responses.

"The number and variety of drugs studied were considerable. For instance, after 76 mg. of potassium iodide was placed in one tooth, absorption was almost complete at the end of one hour, and iodide was demonstrated in the blood, saliva and urine. From 4 to 36 per cent of 20 mg. of phenolsulphonephthalein was absorbed and was found in the urine at the end of 24 hours.

"Apomorphine, in doses of 2 to 20 mg., inserted in the teeth under light ether anesthesia, caused vomiting in 15 to 30 minutes.

"Strychnine (from 10 to 20 mg. in a tooth) caused convulsions in from 40 to 130 minutes. Atropine (from 5 to 20 mg.) dilated the pupils and paralyzed the vagus nerves. Cocaine in a dosage of 5 mg. caused symptoms, and 20 mg. caused death in less than one hour. Nicotine (from 10 to 20 mg.) caused prompt and typical symptoms of poisoning, and death in less than two hours."

It will be recognized that this may lead to other studies of the action of drugs.

MANUFACTURERS' SALES PROBLEMS.

We are quoting *The Oil, Paint and Drug Reporter* on the important subject given in the title:

"Probably in no other line of industry is the problem of distribution more extensively and more intricately interwoven with a manufacturer's sales problems than it is in the drug business. It is, in fact, by far the greatest part of the drug manufacturer's sales problem, and, distribution being more difficult than simple selling to control, it presents him with his greatest difficulties. For the manufacturer of drug products largely distributed through being prescribed by physicians, the problem of distribution is further complicated and more troublesome. So it is that the proposed discussion of coöperation in the distribution of prescription drug products, which will be the outstanding feature of this year's meeting of the American Drug Manufacturers' Association, will tackle one of their biggest problems of to-day."

The same editorial discusses the importance of teamwork in the following paragraph: "The manufacturer, it is almost trite to say, cannot expect to get the coöperation of dealers unless he is ready to coöperate and does coöperate with the dealers. The most difficult part of the procedure is to get coöperation

in the constructing of a plan of so-called 'coöperation.' In that part, in truth, coöperation is of the greatest importance. The plan must have a far wider scope. It must embrace, first, coördination. It must be directed to coördination plus coöperation; that is, to teamwork. Coördination is not easy to attain; and, be it remembered, coöperation without coördination is little more than a nice-sounding word; it is impossible in practice."

PERSONAL AND NEWS ITEMS.

H. P. Caemmerer, *secretary* of the Commission of Fine Arts, has presented the AMERICAN PHARMACEUTICAL ASSOCIATION with a copy of "Washington the National Capital" of which brief notice is given in next Column. The members of the Fine Arts Commission have been most helpful, and the gift is an expression of the cordial relations which have always obtained in the transactions. The appreciation of Secretary E. F. Kelly is voiced in expressing thanks to the members of the Commission. The author has autographed the book, which is a work of art.

Dr. Jacob Diner, dean of the College of Pharmacy of Fordham University since 1920, has retired from his active duties but will remain as *dean emeritus*. Dr. James H. Kidder who was graduated from Fordham in 1924 and the Cornell Medical School in 1928, succeeds him.

Dr. Diner is president of the New York State Board of Pharmacy and has been president of the New York Academy of Pharmacy and of the State Pharmaceutical Association. He also was treasurer of the American Therapeutic Society at one time.

The medal of the American Institute of Chemists has been awarded to Dr. Charles H. Herty. This medal is awarded annually for "noteworthy and outstanding service to the science and profession of chemistry in America," and is given to Dr. Herty in recognition of his efforts over a long period of years on behalf of American chemists and the American chemical industry. Recently, Dr. Herty has aided the economic rehabilitation of the South by his researches on the paper pulp possibilities of the slash pine. This work is being perfected commercially in the new laboratory built for the State of Georgia by the Chemical Foundation.

Matt Noll of Atcheson, pioneer member of the Kansas Pharmaceutical Association, has completed the history of that organization. He has been aided in this work by Mr. Harrold. It is hoped to publish this history in book form.

E. V. Zoeller, of Tarboro, is completing forty years of continuous service on the North Carolina Board of Pharmacy and begins another five-year term. The *North Carolina Journal of Pharmacy* for April expresses its thanks for the assistance rendered on many occasions by Dr. Zoeller. A sketch of the latter will be found in the October number of the JOURNAL OF THE A. PH. A., for 1929.

The *Northwestern Druggist* and the *Northern Ohio Druggist* are both intensely interesting this month on account of bringing together the remarks of physicians and pharmacists relative to the service they can render one another, and the value of coöperation in general. These abstracts of the addresses are helpful and point out the opportunities of coördinated coöperation of physicians and pharmacists everywhere.

THE PHILADELPHIA INSTITUTE FOR MEDICAL RESEARCH.

Judson Daland, president of the Philadelphia Institute for Medical Research, reports that the work of this Institute will begin next fall and that Dr. Leonard G. Rowntree, now director of the clinical investigation of the Mayo Clinic, has been appointed director.

The Institute mentioned will center its activities in Philadelphia General Hospital and will make use of its opportunities for research. At this hospital and in addition, however, it will also hold itself ready to cooperate, aid and facilitate medical research by collaboration or affiliation with any or all medical and allied institutions, desirous of establishing the relationship.

Washington the National Capital—Senate Document No. 332, 71st Congress, 3d Session, is a book of more than 700 pages, beautifully illustrated and bound. It has been prepared by H. P. Caemmerer, secretary of the Commission of Fine Arts. The AMERICAN PHARMACEUTICAL ASSOCIATION building graces page 497 and shows up well, as the paper of the volume is heavy and well glazed. This brings the American Institute of Pharmacy into the National Capital. The book can be purchased from the Government Printing Office, Superintendent of Documents, for $3.00 and it is only because of Government printing in quantity, that this price is possible.

SOCIETIES AND COLLEGES.

COMING IMPORTANT CONVENTIONS.

May 9th–13th—**American Medical Association,** New Orleans, La.

April 18th–21st—**American Drug Manufacturers' Association,** White Sulphur Springs, Va., Hotel Greenbrier.

April 19th—**N. Y. Pharmaceutical Conference,** New York City, Hotel Astor.

April 26th–27th—**Conference on National Drug Store Survey,** St. Louis, Mo., Hotel Chase.

April 26th–28th—**American Manufacturers of Toilet Articles,** New York City, Hotel Ambassador.

May 10th–28th—**International Patent Exposition,** New York City, Hotel Grand Central Palace.

May 12th–13th—**Glass Container Association of America,** White Sulphur Springs, Va., Hotel Greenbrier.

May 16th–20th—**American Pharmaceutical Manufacturers' Association,** Greensboro, N. C., Sedgefield Inn.

May 17th–18th—**The Proprietary Association,** New York City, Hotel Biltmore.

May 19th–21st—**Association of National Advertisers,** Cincinnati, Ohio, Hotel Netherland Plaza.

May 23rd–24th—**Insecticide and Disinfectant Manufacturers' Association,** Chicago, Illinois, Edgewater Beach Hotel.

June 5th–9th—**International Association of Display Men,** Chicago, Illinois, Hotel Sherman.

June 13th–15th—**Flavoring Extract Manufacturers' Association,** Atlantic City, N. J., Hotel Madison.

June 19th–23rd—**Advertising Federation of America,** New York City, Hotel Waldorf-Astoria.

June 28th–29th—**National Guild of Hy-Pure Druggists,** Cincinnati, Ohio, Cincinnati Club.

August 22nd–27th—**American Association of Colleges of Pharmacy,** Toronto, Canada, Royal York Hotel.

August 22nd–27th—**American Pharmaceutical Association,** Toronto, Canada, Royal York Hotel.

August 22nd–27th—**Canadian Pharmaceutical Association,** Toronto, Canada, Royal York Hotel.

September 12th–14th—**United Medicine Manufacturers of America,** Atlantic City, N. J.

September 19th–23rd—**National Wholesale Druggists' Association,** White Sulphur Springs, Va., Hotel Greenbrier.

September 19th–23rd—**National Association of Retail Druggists,** Boston, Mass., Hotel Statler.

September 27th–29th—**Federal Wholesale Druggists' Association,** Washington, D. C.

September or October—**National Chain Store Association.**

October 24th–28th—**Inter-State Postgraduate Medical Association of North America,** Indianapolis, Ind.

December, second week—**Insecticide and Disinfectant Manufacturers' Association,** New York City.

BOTANICAL SOCIETY OF AMERICA.

The newly elected officers of the Botanical Society of America are: *President,* Dr. George J. Peirce, professor of botany and plant physiology, Stanford University; *Vice-President,* Dr. Arthur J. Eames, professor of botany, Cornell University; *Secretary,* Dr. Sam F. Trelease, professor of botany, Columbia University; *Editors* of the *American Journal of Botany,* Dr. Lester W. Sharp, professor of botany, Cornell University, and Dr. B. M. Duggar, professor of physiological and applied botany, University of Wisconsin.

GRANTS REPORTED BY THERAPEUTIC RESEARCH COMMITTEE, A. M. A.

Among a list of grants reported by the Therapeutic Research Committee, A. M. A., the following have pharmaceutical interest and some of them have relation to research which has been reported in the JOURNAL OF THE A. PH. A. The amounts are not given here.

F. B. Flinn, associate professor of physiology, and Adelaide Ross Smith, associate professor in medicine, Columbia University, to investigate the effect of viosterol on the elimination of lead after lead poisoning.

N. E. Schreiber, research fellow, Department of Pharmacology, Morley Chemical Laboratory, Western Reserve University, to investigate the excretion of mercury after oral administration.

C. W. Greene, professor of physiology and pharmacology, University of Missouri School of Medicine, to investigate the pharmacology of camphor and camphor derivatives.

Frank P. Underhill, professor of pharmacology and toxicology, Sterling Hall of Medicine, Yale University, to investigate water and ion changes following burns.

W. F. von Oettingen, assistant professor of pharmacology, and E. E. Ecker, associate professor of immunology, Department of Pathology, Western Reserve University School of Medicine, to investigate the experimental study of the effects of indium salts in the treatment of syphilis.

O. W. Barlow, assistant professor of pharmacology, Western Reserve University, to investigate the effects of morphine on fixed-dose anesthesia.

J. H. Black, Baylor University College of Medicine, for study of the relation of certain pollen fractions, and for the chemical study of ragweed pollen, and study: "A Soluble Specific Carbohydrate of Ragweed Pollen."

W. T. Dawson, University of Texas School of Medicine, Galveston, for chemical and physiologic study of alkaloids of the cinchona series and W. T. Dawson, and S. P. Newman, on "Acquired Allergic Coryzal Reactions to Quinine but Not to Quinidine" and W. T. Dawson, further work on cinchona alkaloids.

SCIENCE CONGRESS AND AUSTRALASIAN PHARMACEUTICAL CONFERENCE.

The 21st meeting of the Australian and New Zealand Association for the Advancement of Science will be held in Sydney during the week commencing August 17, 1932. Mr. H. Finnemore has been nominated as President of Section O (Pharmaceutical Science), and Mr. L. J. Thompson has consented to carry out the secretarial duties. Now that the date of the Science Congress meeting has been fixed an early commencement will be made regarding the meeting of the Australasian Pharmaceutical Conference, which is held annually during the week prior to the Science Association meeting. It is hoped that there will be a large and representative attendance at the 1932 meeting. Pharmacists who are contemplating a visit to Sydney about the time mentioned and are desirous of attending these meetings can obtain further particulars on application to the secretary of the Pharmaceutical Society in their State.—From *The Australasian Journal of Pharmacy.*

PHARMACY IN JAPAN.

There are more applicants for admission to pharmacy schools in Japan than can be taken care of by the institutions—Tokyo Imperial University has 92 applicants and only 32 can be admitted; in other universities and colleges the proportions are as follows: the first number represents the applicants, the other number signifies the number that can be admitted:—Chiba University—488 and 60; Kanazawa University—274 and 60; Nagasaki University—255 and 60; Toyama College—903 and 100; Kumamoto University—766 and 100; Tokushima Higher Technical College—170 and 20. There are private colleges of pharmacy: Tokyo College of Pharmacy, Meiji College of Pharmacy, Osaka College of Pharmacy, Kyoto College of Pharmacy. There are also six colleges of pharmacy for women.

Drug manufacturers in Tokyo and Osaka have recently reached an agreement stipulating that hereafter all names of medicine shall be written in Western style; *i. e.*, horizontally from left to right.

TRI-STATE PHARMACEUTICAL ASSOCIATION.

(NEW MEXICO, ARIZONA, WEST TEXAS.)

The Tri-State meeting named was held in El Paso, March 21st, the chairman—F. A. Cordell—presided; the song fest was led by Dorrance D. Roderick and the invocation pronounced by Dr. Wistor R. Smith. El Paso's Mayor gave the welcome for the City, and Frank A. Cordell for the Local Pharmaceutical Associaton; reponses and greetings on behalf of Texas organizations were by John D. Ray, C. B. Oliver, respectively former president and president of the State Association; Cecil Fitch, Texas Drug Travelers; Editor Walter Cousins, and Dr. F. D. Garrett of the El Paso Medical Society. The Arizona greeters and speakers were represented by Secretary Arthur Lee Phelps, former presidents—Edward Dorsey, Jack M. Robertson, E. C. Stults. New Mexico was represented in the lists by President R. M. Tignor, Robert Jackson and Ernest C. Welch. Among the national representatives were: A. PH. A. President, Walter D. Adams, and President Roblin Davis, N. W. D. A. President F. W. Earnshaw, of West Texas Association, presided over the sessions. The following addressed the meetings and presented papers: Carl F. G. Meyer, St. Louis; F. Z. Williams, Dallas; Harvey Hays, Colorado, Texas; John W. McPherrin, St. Louis; W. M. McAdoo, Carlsbad, New

Mexico; E. L. Robertson, Lubbock, Texas; E. E. Smith, San Angelo, Texas; R. W. Lewis, El Paso; Ernest C. Welch, Albuquerque, New Mexico.

Walker Morrow was toastmaster at the banquet; Captain Irving O'Hay, U. S. A. Retired, well and favorably known as a traveler and humorist, was the principal speaker; Mexican dances were staged by the Mexican druggists of El Paso. A Bull Fight in Juarez was provided by El Paso Retail Druggists Association.

The Committee chairmen were: J. H. Pollard, E. A. Jennings, Charles McDow, W. E. Casteel, Buel Lonier, W. B. Arbuckle, T. C. Gunning, Leonard Butchofsky, J. R. Butler, M. A. Warner, J. L. Stubblefield, O. N. Inabritt, C. E. Porter, J. F. Jackson and Joe Wilson.

CONNECTICUT COLLEGE OF PHARMACY ADOPTS FOUR-YEAR COURSE.

At the meeting of the Board of Trustees of the Connecticut College of Pharmacy, on March 15th, it was voted to adopt the minimum four-year course beginning next September. The other New England schools have heretofore taken similar action, so this places all the schools in that district on the minimum four-year course. The Board of Pharmacy of the State of Connecticut will require graduation from the four-year course for those who matriculate in the fall of 1932 and thereafter.

DISTRICT PHARMACEUTICAL MEETINGS.

Virginia had two district meetings during April. District No. 4 met in a group meeting of the Virginia Pharmaceutical Association at Danville, on April 6th. District No. 1 group of Virginia Pharmaceutical Association held its meeting at Alexandria on April 13th at George Mason Hotel. Both of the programs were interesting and of value to the members.

The meeting in Alexandria had a number of historical features and was in part a contribution to the Bicentennial Celebration of George Washington's birth. Walter S. Nicklin of Alexandria had charge of the sessions, and a talk on the Leadbeater Pharmacy was part of the day's program. The meeting closed with a banquet. Among the speakers were Dean Briggs of George Washington University and Secretary Kelly of the AMERICAN PHARMACEUTICAL ASSOCIATION. Further report must be deferred until next issue.

Maryland held a District Meeting April 12th with about sixty in attendance at Havre de Grace. The unavoidable absence of Dr. R. L. Swain, on account of sickness, was regretted. Dr. Samuel L. Hilton, of Washington, usually attends nearby District Meetings, but he, also, was absent on account of sickness. Both of these active workers are recovering nicely. The Havre de Grace meeting was under the direction of L. M. Kantner, and a pleasing success both as to the program and entertainments. A number of physicians were present and entered into the discussions.

KANSAS PHARMACEUTICAL ASSOCIATION.

The 53rd annual meeting and the 11th annual Drug Show of Kansas Pharmaceutical Association was held at Wichita on April 12th to 14th. The convention was opened with an invocation and the singing of "America." The address of welcome was made by the President of the Chamber of Commerce and the response by C. W. Evans-Lombe, *Vice-President* of the Association. Official reports were made during the remainder of the day; the president's reception was held at night. On Wednesday morning the speakers were Secretary Samuel C. Henry and President Walter D. Adams, with greetings from other state associations. Among the addresses of Wednesday afternoon were those of President John W. Dargavel, a representative of the Governor, and on the revision work of the Committee of the U. S. P. by Dean L. D. Havenhill. Further reports will be made in another issue of the JOURNAL.

ST. LOUIS DRUG STORE SURVEY TO BE BROADCAST APRIL 17TH.

Dr. Julius A. Klein, Assistant Secretary of Commerce, will discuss the National Drug Store Survey to be held in St. Louis, April 26th and 27th. The Conference is to be held at the Chase Hotel and a comprehensive program has been prepared. The opening program will start at 9:30 on Tuesday, April 26th, and Robert L. Lund, Chairman of the National Drug Store Survey Committee, will preside. The address of welcome will be made by the President of the Chamber of Commerce and the response by President Dargavel, of the National Association of Retail Druggists. Other officials connected with the Department of Commerce will outline the survey work which has been done.

At the afternoon session "The Prescription Department" will be presented by Frank A. Delgado of the Department of Commerce, and the discussions will be participated in by Chairman E. Fullerton Cook, Dean C. B. Jordan, and pharmacists Edgar Miche, J. Leon Lascoff, Leonard A. Seltzer and Julius Riemenschneider.

"Sundries and Hospital Supplies" will next be taken up by John R. Bromell, of the Department of Commerce, and the discussions will be led by J. T. Woodside, W. W. Ochse, Thomas W. Hicks and O. U. Sisson. The subjects of the afternoon session are the following:

"Proprietary Medicines and Toiletries" by Nelson A. Miller. Discussion by Leaders Carl Weeks, A. Kiefer Mayer, S. M. Glaser, Edward Plaut, Harlow P. Roberts. "The Soda Fountain" by W. H. Meserole, of the Department of Commerce, with leaders in the discussion—J. M. Drescher, O'Neil M. Johnson, Frank C. Jack, Larry Eli. "Scientific Pricing," under the direction of Wroe Alderson of the Department of Commerce, and as discussion leaders H. J. Ostlund, Paul Olsen, Harry Eiseman, W. H. Harper.

The evening session will introduce The Drug Store from various angles. The Chairman is O. J. Cloughly. Wednesday morning's session will introduce "Modern Methods of Increasing Drug Store Sales and Profits." The afternoon session will be largely devoted to "Promotional Methods." A banquet will close the meeting. President Walter D. Adams of the AMERICAN PHARMACEUTICAL ASSOCIATION will participate in the Wednesday morning program. The presiding officer at the banquet will be Carl F. G. Meyer; Dr. Charles E. Caspari will speak on "The Future of Pharmacy;" W. E. Weiss' subject is "The Future of the Drug Store." F. M. Feiker, director of the Bureau of Foreign and Domestic Commerce will speak on "Making the Survey Dollar Count;" and Robert L. Lund will present "A Program for Using the Survey." Following this will be consideration of resolutions.

RHODE ISLAND PHARMACEUTICAL ASSOCIATION.

Dean W. Henry Rivard, of the Rhode Island College of Pharmacy and Allied Sciences was elected president of the Rhode Island Pharmaceutical Association at the 58th annual meeting on January 13th, succeeding Frank J. Duffy. Other officers elected were: *Vice-President,* Clarence Vars, of Westerly; *Secretary-Treasurer,* James J. Gill, of Providence, and members of the *Executive Committee,* Henry J. McLaughlin, *Chairman;* Louis Guny and James F. O'Connor.

Plans were made for a two-day convention at Narragansett Pier in July. A vote of thanks was given the retiring president and to the retiring secretary-treasurer, Vincent J. Fitz-Simon.

The Rhode Island Pharmaceutical Association is the second oldest State Pharmaceutical Association in the United States.

OFFICERS OF AMERICAN REGISTERED PHARMACISTS ASSOCIATION.

The officers of the American Registered Pharmacists Association are: *President,* James C. Greaver, Oakland; *Vice-President and Executive Secretary,* F. A. Lion, Oakland. *Board of Governors:* James C. Greaver, Oakland; C. S. Fidler, Oakland; George Roux, Oakland; Ernest Forbes, Oakland; Gilbert Flores, San Francisco; Sam Berman, San Francisco; Ernst Ballin, San Francisco; Roy Bridgman, San Jose.

Proceedings of the National Wholesale Druggists' Association, 57th meeting held at Atlantic City, Ambassador Hotel, October 19–22, 1931. General arrangement of Association matters, list of membership, and illustrations follow former issues of the Proceedings very closely. The text matter differs with the annual programs and there is much in the discussions which is of value to all engaged in pharmacy and the drug business; this applies also to the reports of committees.

James M. Pendland, of Texas, was the president, and his successor is Roblin H. Davis, of Colorado. Brief references to the program and proceedings were made in former issues of the JOURNAL OF THE A. PH. A.

Merck & Co. will have the Sixteenth Century Alchemist's Shop reproduced in the form of a diorama in the Hall of Science Century of Progress Exposition in Chicago in 1933. It is now on exhibit at the Administration Building of the Exposition.

We are advised by our fellow member, George Judisch, of the death of Dr. A. J. Weaver of Muscatine, Iowa. He was a former member of the Iowa State Board of Health and was the only pharmacist who served as a member of the Board. He was held in high regard by the members of both professions.

OBITUARY.

MRS. MARGARET M. V. GRAY.

Mrs. Margaret McClintock Victor Gray, Member of the AMERICAN PHARMACEUTICAL ASSOCIATION since 1901, was born in Carlisle, Ky., February 20, 1861; daughter of William H. and Susan J. (Wood) Victor. After a common school education she entered the Illinois State Normal University to prepare for teaching. She was married in 1889 to Harry T. Gray, of Normal, Ill. Mr. Gray was the author of a widely used quiz compend, as well as a practicing pharmacist. He died a few years later and Mrs. Gray decided to carry on his publications—"Gray's Pharmaceutical Quiz Compend," "Gray's Prescriptionist," and "Gray's Urinalysis." Accordingly, she entered the University of Illinois School of Pharmacy in 1897 and was graduated in the class of 1899. Subsequently she took a year of graduate work at Northwestern University School of Pharmacy. For many years she was a member of the Woman's Organization of the Chicago Retail Druggists' Association. She was a regular attendant at the meetings of the Alumni Association of the University of Illinois School of Pharmacy and took considerable interest in the work of the Chicago Branch of the A. PH. A.—W. B. D.

LEON NAHABED CHARKOUDIAN.

Leon Nahabed Charkoudian, member of the AMERICAN PHARMACEUTICAL ASSOCIATION, and of the National Retail Druggists' Association, also of Massachusetts Pharmaceutical Association and treasurer of the Springfield Druggists' Association, died February 16th, at Springfield Hospital, aged forty years.

The deceased was born in Marash, Armenia, and came to this country in 1913. He attended the American International College of Springfield for a year and then was enrolled in the Evening High School; later, he matriculated at the Massachusetts College of Pharmacy, from which he was graduated in Analytical Chemistry in 1918. He was awarded membership in the AMERICAN PHARMACEUTICAL ASSOCIATION on his graduation, which he supported until his death. After graduation, he continued work at the Massachusetts College of Pharmacy, and also at the laboratory of E. L. Patch & Co., devoting considerable attention to cod liver oil.

He engaged in the pharmacy of John Welch and after a year purchased the store, renaming it "Brightwood Pharmacy." Mr. Charkoudian was successful in his undertakings and an outstanding quality was his contribution to other members of his parents' family and the education of several of them. The remembrances in his will to those outside of the family may not have been very large, but they exhibited gratitude on the part of the deceased to those who had aided him and gave him courage "to go forward in face of serious physical handicaps."

DAVID THOMAS BRILES.

David Thomas Briles, of Rocky Mount, North Carolina, died February 12th, after a protracted illness, aged forty-three years. From 1908 to 1918 Mr. Briles held a position with H. R. Horne & Sons of Fayetteville; then he moved to Rocky Mount, where he formed a connection with I. W. Rose Drug Co. of which he was secretary-treasurer until his death.

At the time of his death Mr. Briles was an Alderman and a member of the Board of Health of Rocky Mount. He also took part in other civic affairs.

The deceased is survived by his widow, several brothers and sisters. He was a member of the Chamber of Commerce, of the Kiwanis Club and other fraternal organizations.

Funeral services were held at the Presbyterian Church of which the deceased was a member.

EASTMAN BEQUESTS.

George Eastman, in a codicil to his will signed and witnessed a few hours before his death, March 14th, left the bulk of his $20,000,000 estate to the University of Rochester.

The share of the University of Rochester is valued at about $12,500,000. The Eastman mansion in East Avenue goes to the university as an official residence for its president.

Next to the University of Rochester, the Rochester Dental Dispensary will benefit most from Mr. Eastman's will, $1,000,000 having been left to that institution.

Bequests of $50,000 each, were made to the Rochester General Hospital, and the Genesee Hospital.

LEGAL AND LEGISLATIVE.

NARCOTICS CONVENTION IS RATIFIED BY U. S. SENATE.

The international convention for the further control of traffic in narcotics, concluded at Geneva in July 1931, was ratified by the Senate, without debate. The Senate also ratified six reservations made by the representatives of the United States at the time they signed the convention. These chiefly set forth that the relevant laws of the United States are not to be weakened because of the convention and may be made stronger than the international restrictions, if desired.

MAILING OF PRESCRIPTIONS.

"Preparations compounded on physicians' prescriptions which are prepared in the District of Columbia or the territories, or which enter the channels of interstate commerce, must comply with the labeling requirements of Section 8 of the Act, Paragraph 2 (Food and Drugs Act), in the case of drugs." This means that if a druggist compounds a physician's prescription and sends it into an adjoining State by mail, or express, or otherwise, the label must state the amount of alcohol, morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, or acetanilid, or any derivative thereof. This applies whether the preparation is a U. S. P. or National Formulary product, or not. The only exception is that if a package compounded according to a physician's prescription is carried by the patient himself, or a member of his household, or the physician himself across a State line and is not subject to sale it need not be marked so as to conform with the law, because the transaction is not considered one of interstate commerce.

RECENT COURT DECISION IN CALIFORNIA.

The Court in rendering its decision in the Application of Scott & Gilbert for Writ of Injunction against the State Board of Pharmacy stated that the Gray Case is binding upon the Court.

The plaintiff contended the right to sell anywhere within or without the three-mile limit the following seventeen articles—five contended not to be drugs or medicines, and that the State Board had no right to regulate the sale, namely:—Cardamom seed, zinc oxide tape, hydrogen peroxide, saltpetre, cod liver oil and contending that the twelve following items are registered trade-marked proprietary medicines, and being within the Act—namely, "nor does this act apply to registered trademarked or copyrighted proprietary medicines registered in the U. S. Patent Office," and consequently may be sold by anyone anywhere, the following: Cespi Syrup of Figs, Cespi White Pine & Tar, S. & G. Cathartic Pills, Cespi Eucalyptus Ointment, Cespi Cascara Tablets, S. & G. Arnica Salve, S. & G. Menthol Syrup, S. & G. Magnesia Lax., S. & G. Cascara Quinine, California Syrup of Figs, Phillips Milk of Magnesia.

The Court found the first five:—Cardamom seed, zinc oxide tape, hydrogen peroxide, saltpetre, cod liver oil—to be medicines, even though they may have other uses and within the regulation, and the other twelve items, although branded with S. & G form of Trade mark of firm name, were not "Proprietary" medicines and therefore are subject to regulation under the Pharmacy Act.

The Court's definition of a "Proprietary Medicine" is "Any medicine or preparation, the name of which does not describe the constituents or ingredients, such as Tanlac, Pinkham's Compound, Beechman's Pills, Zemo, H. H. H., Pierce's Golden Medical Discovery, Pierce's Favorite Prescription, etc. Such names not giving any intimation of what they are or what they are intended to cure."

The judgment therefore was rendered for the Defendant—The State Board of Pharmacy—the first group—"Medicines;" the second group—"Proprietary Medicines."

DEATH FROM RADIUM WATER ALLEGED.

The death of Eben M. Byers of Pittsburgh is said to have been the result of drinking radium water during a long period of time. The news item states that "Mr. Byers was incurably ill, when charges were preferred against the laboratories." "The patient had also used up about 1400 bottles of the radium water." There is no excuse for indiscriminately selling preparations that may produce harm and it is probably true that preparations of this type are sold, which are not all that they claim for the product, but there seems to be a number of contributing causes in this case.

BOOK NOTICES AND REVIEWS.

Allen's Commercial Organic Analysis, a treatise on the properties, modes of analysis, and approximate analytical examination of the various organic chemicals and products employed in the arts, manufactures, medicine, etc., with concise methods for the deduction and estimation of their impurities, adulterations and products of decomposition. Volume 9, "The Proteins of Plants, the Proteins of Milk, Milk Products and Meat Products," by the Editor and the following contributors: C. Jordan Lloyd, G. D. Elsdon, H. Leffmann, John Golding, E. R. Zolton, C. Robert Moulton, Editor C. Ainsworth Mitchell, M.A., E.Sc., F.I.C., Editor of the Analyst Consulting Chemist, London. Fifth Edition, revised and partly rewritten. Published by P. Blakiston Sons & Co., 1012 Walnut St., Philadelphia, with an outline of the subjects of the volume. The work is well and favorably known and those who make use of it, freely cite the volume to others engaged in their respective activities. As is the case with all publications that have continued for a long period and, as far as possible, retained the same co-workers, some will be missing from the list of revisers, and that is the case with this volume, possibly more than with the others. There is really only one name which appears in both editions; that is, E. R. Bolton, who has revised the article on "Milk Products," written by him in collaboration with C. Revis for the former edition.

The work of the late Dr. Henry Leffmann, well and favorably known by pharmacists and chemists, was completed by Capt. J. Golding. A part of the former revision on the "Proteins of Milk" was undertaken by G. D. Elsdon. "The Section on Plant Products" was rewritten by Dr. D. Jordan Lloyd and that on "Meat and Meat Products" by Dr. C. R. Moulton.

The present edition of "Allen's Commercial Organic Analysis," will comprise ten volumes; the intention was to complete it in nine, but the additional number of pages would have resulted in a volume less convenient than represented by the present number of pages.

Each volume of "Allen" is sold separately.

Man and Microbes. By STANHOPE BAYNE-JONES, Professor of Bacteriology, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y., published by the Williams and Wilkins Co., and associates in coöperation with the Century of Progress Exposition, 1932. A list of commemorative publications has been issued and all of these books are to be sold at $1.00 per volume. They are to be written, as far as possible, in language that will attract the laymen, but the science of the subjects presented in these books will not be academic, as authors have been selected who know their subject and are outstanding in their respective lines. While "Fighting Disease with Drugs" represents pharmacy, it deals with more subjects than pharmacy and it may be that a book on pharmacy, fitting into the series, should be published, not only because it would be of interest but also because pharmacy will be represented at the World's Fair.

The author states that the celebration of a Century of Progress almost coincides with the three hundredth anniversary of the birth of van Leeuwenhoek. Leeuwenhoek saw and pictured bacteria and other germs. Intensive study, however, of the nature and activities of microbes dates only from about 1833. The author has done exceedingly well in picturing such a broad field in a book of about 130 pages.

Anthonius van Leeuwenhoek graces the first page; a drawing of one of his microscopes and a diagram of a modern compound microscope is shown, and a number of other pictures which the author has found useful in illustrating his subject. Dr. Bayne-Jones has set a good example for other authors of the series.

The Registers of Pharmaceutical Chemists and Chemists and Druggists, printed and published under the direction of the Pharmaceutical Society of Great Britian. This informative book of 564 pages is issued by the Pharmaceutical Society of Great Britain. While most useful for British pharmacists it has value for those in other countries and, especially, for publication offices. This office, therefore, expresses thanks and appreciation for being remembered in the distribution of the *Register*.

MADRID'S PHARMACIST-FIDDLER.

Although Spain's historic capital is, at present, mostly given over to doggerel revolutionary ditties, which the mob delights in bellowing, there is an elderly pharmacist whose evenings are devoted to playing good violin music for his friends' delectation. Many years ago the enthusiastic amateur so pleased Sarasate that he contemplated forsaking pharmacy and becoming a fiddler. The eminent violinist, how-

ever, persuaded the young pharmacist to remain among his potions and bolusses, assuring him that few musicians grew rich, and that suffering humanity would always need physicking. The pharmacist (he then was his father's assistant) took Sarasate's advice, eventually becoming proprietor of a flourishing business. But for half a century the violin has been Migel Garcia's delight, and so adroit a performer is he that all Madrid speaks of him as "our pharmacist-fiddler." One result of this devotion to music is that his establishment, in the famous Puerta del Sol, is uncommonly well advertised; he scarcely needs to spend a "peseta" on newspaper space. Each time Migel Garcia plays at a musical party the store is indirectly boomed.

Curiously enough, the pharmacist has not inherited this passion for music. He is no relation to the famous Manuel del Popolo Vicente Garcia,[1] who taught his daughters (Malibran and Viardot), nor of the second Manuel, the instructor of Jenny Lind. Indeed, the chemist-fiddler's ancestors were mostly in the same line of business as himself and for generations back, while his father and grandfather rather disliked musical performances, having no respect even for celebrated performers. Consequently, Señor Garcia's pronounced talent remains a mystery, baffling every relative.

This superexcellent amateur, though devoted heart and soul to music, is a keen business man. Except for the midday lunch and customary "siesta," which follows the meal, he remains in the shop from nine till six. An hour's violin practice comes next, and the evening is spent playing at home, or elsewhere, to friends.—GEORGE CECIL.—Through *Australasian Pharmacy Journal*.

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[1] Manuel del Popolo Vicente Garcia, born at Seville, Spain, January 22, 1775; died at Paris, June 2, 1832. He founded a famous school of singing in London, 1823. (Malibran and Viardot referred to in the article were his daughters.)

Manuel Garcia was born at Madrid, March 17, 1805. A Spanish teacher of music. His application of the laryngoscope and his *Memoire sur la voix humaine* (1840) may be said to be the foundation of all subsequent investigations of the voice (Grove). He went to London in 1850, and was professor at the Royal Academy of Music.

ADDITIONAL OBITUARY NOTES.

ALFRED WALKER.

Alfred Walker, prominent pharmacist of Sutton, W. Va., died, after protracted illness, on March 21st. The deceased had been prominent in pharmaceutical affairs, not only of his home city and state but also nationally. He held the high regard of his fellows and was a pharmacist of wide information. Appointed member of the West Virginia Board of Pharmacy in 1901, he held the position until the time of his death, and had been secretary of the Board for about thirty years. He was the first president of West Virginia Pharmaceutical Association, and last year was special guest of honor of that organization.

Mr. Walker was born at Bloomville, Ohio, April 12, 1863. Besides his associations in pharmacy he was connected with the bank of Gassaway. He was affiliated with the Masonic bodies and other social and fraternal organizations. He is survived by his widow, son and daughter.

DR. WILHELM OSTWALD.

Wilhelm Ostwald, physicist, who won the Nobel Prize for chemistry in 1919, died at his home in Grossbothen (near Leipzig), April 4th, aged 78 years. Dr. Ostwald was the first German Exchange Professor at Harvard, called in 1905. At least two of his discoveries are notable—his process of photographic printing and of obtaining nitrogen direct from the air.

Dr. Ostwald was a guest lecturer in a symposium of celebrated scientists at the St. Louis World's Fair; the author of several textbooks; editor for a time of "Physikalische Chemie" and "Annalen der Naturphilosophie." He was educated at the University of Dorpat (where Dragendorff taught); he held professorship at the Polytechnic School in Riga, at the University of Leipzig and later, director of the Physico-Chemical Institute.

Charles F. Nixon, Leominster, Mass., who formerly conducted a drug store in that city for a number of years and was afterwards city bacteriologist, died there March 10th. He was a former member of the Massachusetts State Board of Pharmacy; the Leominster School Committee; the Boston Druggists' Association, and a past-president of the Massachusetts State Pharmaceutical Association. He was active in revision work for many years and as member of the A. PH. A.